

APPENDIX I

GLOSSARY

Glossary

Introduction

One important key to success in any technical rate is mastery of the language associated with it. Learn the glossary as an integral part of your learning process. Use the terms other professionals are using in your field.

A

ACCENT LIGHT—A light that highlights or emphasizes the subject in a scene.

ACETATE—Tough, transparent, or semitransparent sheets available in various thicknesses used as overlays in color separation, friskets in retouching, cels for animated drawings, and displays. Treated acetate readily accepts ink and paint.

ACHROMATIC—Black, white, and the grays in between.

ACRYLIC PAINTS—*See* POLYMER.

ACTINIC LIGHT—The short waves of the light spectrum (green, blue, and ultraviolet) that cause chemical changes in light-sensitive photographic emulsions.

ACTION LINES—Extra lines drawn around or following a cartoon figure or object to emphasize motion.

ACTIVATOR—The solution or chemical that starts the reaction of the developing agent in a photosensitized emulsion.

ADDITIVE PROCESS—A process that produces white light by starting with darkness and combining colored light.

ADHESIVE—(1) A gelatin or casein used as a binder in pigment; (2) A chemical compound used as a glue.

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Glossary, Continued

- A (Continued)** **ADVANCING COLORS**—Colors that appear to come forward, such as red, yellow, and orange.
- AESTHETIC**—Pertaining to the beautiful, particularly in art.
- AGATE**—Type size of 5 ½ points.
- AIRBRUSH**—An atomizer that applies a fine spray of paint under pressure from a tank of compressed air or carbonic gas.
- AIRBRUSHING**—Using an airbrush to create art or improve the appearance of art.
- ANALOGOUS COLORS**—Colors closely related to one another on a color wheel, such as blue, blue-green, and green.
- ANATOMY**—The bone and muscle structure of humans and animals as it affects the appearance of surface forms and contours.
- ANGLE**—A figure formed by two lines or planes extending from, or diverging at, the same point.
- ANHYDROUS AMMONIA SYSTEM**—A system that uses a mixture of water and ammonia in the developing section of some whiteprint machines.
- ANILINE COLORS**—Brilliant colors derived from coal tar that tend to fade in time.
- ANIMATED CARTOON**—A cartoon drawn in a series of progressive actions to give the effect of continuous movement.
- ANIMATION**—Sequentially drawn pictures displaying a range of motion which, when viewed in rapid succession, appear to be moving.
- ALIGNED SECTION**—A sectional view that revolves some internal features into or out of the plane of view.
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Glossary, Continued

- A (Continued)** **AMERICAN STANDARDS ASSOCIATION**—*Also called ASA. See ISO or EXPOSURE INDEX.*
- ANTIQUE STOCK**—A rough-surfaced paper, such as wove or laid.
- APERTURE**—An opening behind the lens that allows exposure to one frame of film.
- APPLICATION BLOCK**—The part of a drawing of a subassembly, showing the reference number for the drawing of the assembly or adjacent subassembly.
- ARC**—A portion of a curved line.
- ARC LAMP**—A light source resulting from the application of current to two carbon electrodes that form an electric arc.
- ARCHITECT'S SCALE**—A scale used when dimensions or measurements represent feet and inches.
- AREA (PICTURE)**—The flat surface within the border of a picture.
- ARROWHEAD**—An indicator shaped like an elongated triangle used at the end of a lead line to direct attention to an object or a point of reference.
- ART**—Any copy other than text; any photograph, painting, or drawing in line, halftone, or continuous tone.
- ART BRUSHES**—*See BRUSHES.*
- ART GUM**—A soft, grit-free eraser used to clean drawings and remove unwanted pencil lines.
- ARTIST'S BOARD**—*See ILLUSTRATION BOARD.*
- ARTWORK**—Illustrations, drawings, photographs, renderings, paintings, sketches, and copy.
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Glossary, Continued

A (Continued)

ASCENDERS—The part of lowercase letters that project above the main body waistline, such as h, d, and f.

ASPECT RATIO—The proportion of the media format that governs the size of the original artwork.

ASSEMBLE EDITING—Putting scenes in chronological or progressive order.

ASYMMETRICAL—An informal balance of objects or sections of equal mass and weight on each side of a center line.

ATTITUDE—A position or action of the body or part of the body that approximates an emotion, character, or personality.

ATTRIBUTES OF MEDIA—Specific characteristics of a chosen medium.

AUDIO—Sound that is heard.

AUDIO-TUTORIAL—*Also called* AT. Instructions given to a student that uses primarily sound.

AUDITABLE PICTURE ADVANCE SIGNAL—An audible signal that indicates the moment to change the image to another.

AUTO-TRACE—A software option that allows the tracing of one image into another file option.

AUXILIARY VIEW—A drawing showing the true shape of objects that have features not parallel to the three principal planes of projection.

AXONOMETRIC PROJECTION—A drawing that shows the inclined position of an object in an isometric, dimetric, or trimetric format.

B

BACKGROUND ART—Design, texture, pattern, or other form of artwork used to create a background effect for type and illustration.

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Glossary, Continued

B (Continued)

BACKUP—The registration of two sides of a printed sheet.

BALANCE—A harmonious arrangement of the various components in a picture plane in a symmetrical (formal) or asymmetrical (informal) format.

BALL-AND-SOCKET JOINT—A flexible joint that rotates in all directions.

BALLOON—(1) A space containing the words spoken by cartoon characters; (2) A distortable shape used as a base to draw a cartoon head.

BALLOON LETTERING—Informal, single-stroke lettering used in comic strip balloons.

BAR CHART—A graphic representation comparing numerical values by means of rectangles of equal width.

BASE ART—*Also called BASIC ART and BLACK ART. See BLACK ART.*

BEADED SCREEN—A screen comprised of glass or plastic beads that reflect light from a projected image.

BEAM COMPASS—A compass capable of drawing circles and arcs that exceed the limits of a standard compass.

BEND ALLOWANCE—An additional amount of metal used in a bend in metal fabrication.

BENDAY—Mechanical shading applied to artwork to give a variety of tones to line drawings. Benday is named for its inventor, Benjamin Day.

BÉLZIER CURVES—A computer tool that draws precise curves with great accuracy.

BILL OF MATERIALS—A list of standard parts or raw materials needed to fabricate items.

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Glossary, Continued

B (Continued)

BINDER—An adhesive, coagulate, reducer, or extender added to pigments to maintain consistency, to promote adhesion, and to facilitate application.

BISECT—To divide into two equal parts.

BIT—The smallest unit of electronic information a computer can handle.

BIT MAP—*Also called* PIXEL MAP. A matrix of dots or pixels.

BLACK ART—*Also called* BASE ART. Art used in making process plates for illustrations of two or more colors.

BLACK-AND-WHITE—(1) Line art executed in a black-and-white medium only; (2) Continuous-tone art executed in black, white, and intermediate tones.

BLACK PATCH—A black masking patch pasted into the exact size and location on artwork where a photograph is to appear on the reproduction copy.

BLEED—The borders on the artwork and printing plate that extend beyond the final trimmed edge of the sheet.

BLENDING—Mixing or incorporating one color or tone with another.

BLOCKING IN—Indicating the broad outline of objects or shapes in a picture using preliminary lines.

BLOCK OUT—Eliminating an unwanted section of a picture.

BLOWUP—An enlargement.

BLUEPRINT—A direct, positive print made on chemically treated paper from a translucent or transparent drawing.

BOARD—Any heavy material used for mounting art or making displays.

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Glossary, Continued

B (Continued)

BOARD ART—Any artwork mounted on heavy board stock.

BODY TYPE—Type used for the main body of text in printed matter.

BOLDFACE—Type emphasized by darkening or increasing letter weight.

BOOKLET—A pamphlet bound within paper covers.

BOOT-UP—Start-up of the computer.

BONE—An instrument with a plastic, agate, or metal tip used for burnishing shading sheets, pressure-sensitive letters, and paste-ups.

BORDER AREA—The areas around a graphic that represents a protective perimeter.

BOUNCE LIGHT—Lighting set up to reflect from nearby surfaces onto a subject.

BOURGES PROCESS—A method of color separation using prepared colored or toned papers or acetate sheets.

BOW INSTRUMENTS—Drafting tools that draw circles and arcs less than one inch in diameter.

BOX—To enclose with borders or rules.

BREAK LINE—Lines to reduce the graphic size of an object, generally to conserve paper space.

BRIEFING CHART—*Also called BRIEFING PAD.* A visual aid that presents information on large paper or board.

BRIGHT—A short haired, flat, chisel-shaped brush.

BRISTLE.—A hog hair brush used primarily in oil painting.

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Glossary, Continued

B (Continued)

BRISTOL BOARD—A drawing surface made of fine, tough, flexible cardboard available in several thicknesses and in a variety of surfaces.

BROADSIDE—*Also called* BROADSHEET. A large, folded advertising piece.

BROCHURE—A bound pamphlet.

BROKEN COLOR—Two or more colors applied simultaneously to artwork without prior mixing or blending.

BROKEN OUT SECTION—An auxiliary view used when a partial view of an internal feature is insufficient.

BROWNPRINT—A photographic print or silverprint that produces a brown image.

BRUSHES—A collection of bristles or hairs used to apply pigment and glues.

BULLET—A symbol (●) used to preface listed items.

BURNISH—The application of pressure to secure paste-ups, shading sheets, and lettering to artwork.

BURNISHER—*Also called* BONE. An instrument made of plastic, wood, glass, metal, stone, or ivory used to flatten, smooth, or polish a surface with hand pressure.

BUSY—Excessive or competing detail.

BUTTON BAR—*Also called* TOOL BOX. A program specific legend of options available to a computer user.

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Glossary, Continued

C

CABINET PROJECTION—A type of oblique drawing with the angled receding lines drawn to one-half scale.

CALLOUT—To call attention to a part or item in an illustration.

CAMCORDER—A video camera and recorder in one unit.

CAMEO PAPER—Paper of a dull, smooth finish used frequently for carbon and graphite pencil drawings.

CAMERA LUCIDA—*Also called* LACEY LUCY. An instrument with prism lenses used for enlarging or reducing artwork.

CAMERA-READY COPY—*See* REPRODUCTION COPY.

CANVAS—A surface made of cloth, usually cotton or linen, for painting.

CANVAS BOARD—Cardboard covered with cotton or linen used as a surface for painting.

CANVASKIN—A paper with a textured surface resembling canvas.

CAPTION—Any descriptive heading or title for an illustration or table.

CARBON PENCIL—Pressed carbon in a wood casing.

CARICATURE—The deliberate exaggeration and distortion of prominent features or mannerisms.

CARPENTER'S PENCIL—A wide, flat lead pencil ideal for chisel point lettering or laying in broad tones.

CARTOON—A comic or satiric drawing.

CARTOUCHE—A scroll-like design used ornamentally in printing or hand lettering.

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Glossary, Continued

C (Continued)

CASEIN—A curd of milk and lime used as a binder in tempura paint.

CAVALIER PROJECTION—A form of oblique drawing with the receding lines drawn full scale at 45° to the orthographic front view.

CD—*See* COMPACT DISK.

CD ROM—*See* COMPACT DISK READ-ONLY MEMORY.

CEL—Acetate overlays used in television art and animation.

CEL LEVEL—The number of cels placed one over another on the same background and photographed at the same time.

CENTER DISK—A drafting instrument that protects the paper surface from damage when drawing multiple concentric circles with a compass.

CENTER OF INTEREST—The part of the picture that attracts the most attention.

CENTER LINE—Lines that indicate the center consisting of alternating long and short dashed evenly spaced.

CENTER SPREAD—Two facing pages formed by one folded sheet of paper.

CENTRAL PROCESSING UNIT—Also *called* CPU. The integrated circuit (IC) chip that controls the speed and processing power of the computer.

CHAIN or CIVIL ENGINEER'S SCALE—A scale, generally triangular, divided in decimal units or units of 10.

CHARACTER—Any letter, number, punctuation mark, or space in printed matter.

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Glossary, Continued

C (Continued)

CHARACTER GENERATOR—A computer hardware or software device that provides a means for formulating a character font and as a controlling function during printing.

CHARCOAL—Specially charred willow sticks used for drawing on a paper with tooth.

CHARCOAL DRAWING—A drawing made with charcoal.

CHARCOAL PENCILS—Charred willow sticks encased in wood for strength.

CHIAROSCURO—Rendering forms using a balanced contrast between pronounced light and dark elements.

CHINESE WHITE—An opaque white watercolor pigment.

CHISEL POINT—Drawing or lettering with a wide, flat point.

CHORES—Used to trap a dark element over a light background to avoid or minimize white space showing around the element during press plates misalignment.

CHROMA—*See* INTENSITY.

CIRCULAR SCREEN—A photographic screen used with a process camera, which allows screen adjustment to eliminate the wavelike or checkered effect, called moire.

CIRCUMFERENCE—The length of a line that forms a circle.

CIRCUMSCRIBED—To draw around or enclose within one geometric form another form or object.

CLICK ON—To select a computer function by clicking the buttons on a mouse.

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Glossary, Continued

C (Continued)

CLIP ART—A collection of artwork filed away for future use.

CMYK—An acronym for cyan, magenta, yellow, and black, a color specification system for color separation and printing.

COATED PAPER—Paper coated with a finely ground filler or clay to produce a smooth surface.

COBALT DRIER—A liquid agent used in a medium to accelerate the drying of oil paints.

COLD COMPOSITION—Composition of type that uses no molten metal to form the image.

COLD MOUNT—A method of mounting artwork or photographs to a surface.

COLD PRESSED—A paper or illustration board with a medium to rough surface texture.

COLLAGE—Artwork made by arranging and pasting pieces of cloth, newspaper, and various other materials on a surface to form a composition.

COLLATING—Gathering single sheets or leaves in sequence.

COLLOTYPE—A method of reproducing paintings and drawings using a gelatin plate.

COLOR—A sensation caused by light waves of different lengths comprised of three elements: hue, value, and intensity.

COLOR BARS—Bars of color that appear on a video screen to facilitate fine tuning of the color resolution.

COLOR BLENDING—Blending or combining different colors to form another color or smooth gradient.

Continued on next page

Glossary, Continued

C (Continued)

COLOR CHART—An arrangement of colors.

COLOR CYCLING—A spectral effect that creates the illusion of movement on the computer screen.

COLOR DIMENSIONS—The three elements of color: hue, value, and intensity.

COLOR GRAPHICS ADAPTER BOARD—*Also called CGA or a Video Graphics Adapter (VGA).* This IC chip defines the ability of the computer to execute commands during the creation of artwork in the computer.

COLOR HARMONY—A unified or aesthetically pleasing effect produced by a combination of colors.

COLOR INTERVAL—The degree of visual difference between two colors as measured by hue, value, and intensity.

COLOR KEY—The overall effect of the selected palette; for instance, a high-key illustration of light, bright or vibrant color and a low-key illustration of dull or monotonous colors.

COLOR NOTATION—The specification of color by written symbols and numerals based on an established color system used on sketches for future reference.

COLOR PROOF—An engraver's or printer's proof showing the effect of final color in perfect registration.

COLOR SCALE—A series of colors that displays a change or gradation in hue, value, and intensity.

COLOR SCHEME—A group of colors that dominate a picture or create a unity within it.

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Glossary, Continued

C (Continued)

COLOR SEPARATION—(1) The photographic process of separating full-color originals into the primary printing colors; (2) An artist manually separating the originals for full color reproduction in the creation stage of a master artwork.

COLOR SKETCH—A rough drawing or layout approximating the color in the final picture.

COLOR SYMBOLISM—The use of color to signify or suggest an emotion, idea, or characteristic.

COLOR WHEEL—A circular color chart with colors arranged according to their positions as a primary, secondary, or tertiary color.

COLUMN—(1) A section of text or other matter that makes up a vertically divided page; (2) A vertical section of a table.

COMBINATION PLATE—A press plate that combines both halftones and line work.

COMIC STRIP—A series of drawings, in panel format, portraying the adventures of characters, humorous or otherwise, usually published in newspapers.

COMMERCIAL ART—Artwork of any kind prepared for commercial advertising and general promotion.

COMPACT DISK—*Also caLLed* CD. A small disk of electronic files encased in a plastic casing.

COMPASS—An instrument for drawing circles and arcs.

COMPUTER DISPLAY MONITOR—An output device that allows the computer operator to see an image of electronic media on a cathode-ray screen similar to a television monitor.

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Glossary, Continued

C (Continued)

COMPUTER PLATFORM—The use of a particular brand of computer to develop software programs specifically for that brand.

COMPLEMENTARY COLORS—Any two opposing hues on a color wheel.

COMPOSITE—Comprised of two or more parts.

COMPOSITION—The arrangement of forms, colors, lines, and other pictorial units.

COMPOSITOR—A machine that converts electronic data into an acceptable format for a printer.

COMPREHENSIVE—A layout of art or type, either in black-and-white or color.

COMPREHENSIVE SKETCH—A finished layout that defines all of the elements, such as type, illustration, and spacing.

COMPRESSED FILES—Compacting computer-generated files to save disk and memory space or to facilitate faxing.

COMPUTER GRAPHICS—Artwork created by the use of a computer.

CONSTRUCTION—The drawing of objects so that they appear solid or three dimensional.

CONSTRUCTION LINES—Lightly drawn lines used in the preliminary layout of a drawing.

CONTACT SCREEN—A screen placed in direct contact with the film or plate to obtain a halftone pattern from a continuous-tone original.

CONTINUOUS-TONE ART—Artwork created using any medium that does not use a halftone process to represent tone.

Continued on next page

Glossary, Continued

C (Continued)

CONTOUR PEN—Adjustable pen nibs on a rotatable shaft used for drawing curvilinear lines.

CONTRAST—The range of tonal differences.

COOL COLOR—Colors that appear to project cooler temperatures.

COOLED COLOR—A color resulting from the addition of a cool color to a warmer color.

COPY—Any matter, including photographs, rules, designs, and text, used for producing printed matter.

COPYBOARD—A table or frame that holds original copy during a photographic exposure.

COPYFIT—Scaling copy to fit into an allotted space.

COPYRIGHT—Exclusive protection of ownership given to a creator of an original work.

COQUILLE BOARD—A drawing board that comes in a variety of roughened surfaces that break up crayon or brush strokes into texture more suitable for line reproduction.

COURSEWARE—All materials pertaining to a software program or course of instruction.

CPU—*See* CENTRAL PROCESSING UNIT.

CRAWL DEVICE—A rotating drum used to display credit lines for television transmissions.

CREMNITZ—*See* WHITE LEAD.

CROP—To cut off.

Continued on next page

Glossary, Continued

C (Continued)

CROP MARKS—Marks used to define the limits of an image for reproduction.

CROPPING—Defining the limits of an image for reproduction.

CROSSHATCH—Parallel lines drawn across other parallel lines to indicate tone.

CROW QUILL—A fine, stiff pen nib with little spring used for drawing fine lines and lettering.

CRT—*Also called* CATHODE-RAY TUBE. A screen or monitor that converts light rays to electrical impulses for transmission or receiving.

CUBE—A solid form of six equal square sides.

CURSOR—A position indicator on a computer monitor.

CUTAWAY DRAWING—A drawing where a portion of the object is cut away revealing the internal structure.

CUTLINE—The placing of a caption in an illustration.

CUTTING PLANE LINE—A sectional view showing a theoretical cut on the item.

CYAN—Light blue-green color.

CYCLE OF ACTION—The completion of a single action of animated movement.

D

DAISY WHEEL PRINTER—A spinning wheel with spokes having raised letters and numbers.

DAMAR FINISH—Varnish used as a final protective coat over a painting or mixed as part of the painting medium.

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Glossary, Continued

D (Continued)	<p>DATA POINTS—Symbols used to plot information or events on a graph or chart.</p> <p>DATUM LINE—A line that indicates the position of a datum plane.</p> <p>DEADLINE—Final delivery date.</p> <p>DEBUGGING—Locating and eliminating software deficiencies.</p> <p>DECAL—<i>See</i> DECALCOMANIA.</p> <p>DECALCOMANIA—An image printed on specially prepared paper or film for transfer to another surface.</p> <p>DECKLE EDGE—The rough or uneven edge of paper intentionally produced during manufacturing.</p> <p>DELINEATE—To give depth to line art by making particular lines heavier.</p> <p>DENSITY RANGE—<i>Also called</i> DENSITY SCALE. Measured differences between the minimum and maximum densities of a particular negative or positive.</p> <p>DEPICT—To represent.</p> <p>DEPTH—Thickness as measured downward from the surface of an object.</p> <p>DEPTH OF FIELD—The distance between the closest sharply focused point to the farthest point in focus.</p> <p>DESCENDERS—The parts of lowercase letters that fall below the main body base line, such as g, p, and q.</p> <p>DESIGN—A planned or intended arrangement of the elements in a composition.</p> <p>DESIGNERS COLORS—Opaque watercolors of high quality.</p>
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Glossary, Continued

- D (Continued)**
- DESKTOP PUBLISHING**—The preparation of copy ready to go directly to press.
- DETAIL DRAWING**—A drawing that gives specific information.
- DETAIL PEN**—*Also called* SWEDE PEN. A broad nibbed, adjustable ruling pen with greater ink capacity than a standard ruling pen.
- DETAIL VIEW**—A view that shows part of the principal view of an item using the same plane and arrangement but in greater detail and in a larger scale.
- DEVELOPER**—A chemical that causes a reaction in an exposed emulsion to reveal an image in that emulsion.
- DIAZO FILM**—A flexible transparent base coated with an emulsion of diazo salts and couplers.
- DIAZO PAPER**—Paper treated with a diazo compound and azo dyestuff component.
- DIAZOCROME**—Diazo sensitized films that produce colored dye images on a transparent plastic base.
- DIFFUSED LIGHT**—Evenly spread light.
- DIMENSION LINE**—A thin, unbroken line with each end terminating in an arrowhead used to define the dimensions of an object.
- DIMETRIC PROJECTION**—An axonometric projection of an object where two axes make equal angles with the plane of projection and the third axis makes a smaller or larger angle with the plane of projection.
- DINGBATS**—Stars or ornaments used to embellish type.
- DISCHORD**—Color or elements that compete or are not in visual harmony and create uneasy or unattractive images.
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Glossary, Continued

- D (Continued)**
- DISK**—*Also called DISC.* (1) A flat photomatrix used in phototypesetting and computer equipment; (2) A layer of magnetic oxide used to store electronic data.
- DISK DRIVE**—A device that reads, adds, or deletes information stored on a disk.
- DISPLAY LETTERING**—Any large, prominent lettering used to attract attention.
- DISPLAYS**—A collection of objects and images arranged to tell a story.
- DISPLAY TYPE**—Large type used for headings and titles.
- DISSOLVE**—The fading of one scene as another replaces it.
- DISSOLVE UNIT**—An electronic device that automatically pulses a slide projector to dissolve an image and replace it with another.
- DISTORTION**—Changed or twisted out of natural shape.
- DIVIDERS**—An instrument used for dividing lines into equal segments and transferring measurements.
- DOMINANT**—Prominent or most important.
- DOT MATRIX PRINTER**—A printer that uses a number of pins to form letters and numbers.
- DOTS PER INCH**—*Also called DPI.* A standard measurement for resolution in the computer graphics industry.
- DOUBLE-ACTION AIRBRUSH**—An airbrush that requires the user to push down a button to expel air through the brush and to pull back the button to release paint.
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Glossary, Continued

- D (Continued)** **DRAFTING MACHINE**—A machine that combines the functions of a T-square or straightedge, a triangle, a ruler, and a protractor.
- DRAWING**—The representation of objects, ideas, or emotions on a flat surface using line, tone, or color.
- DRAWING THROUGH**—Sketching in the structural lines of an object as if it were transparent.
- DRIER**—A substance used to hasten the drying times of paint or ink.
- DROP CARDS**—Drop-out or drop-in title cards rigged to fall in and out of camera view.
- DROP OUT**—Masked or opaqued areas present in the halftone negative, print, or plate.
- DROP-OUT HALFTONE**—A halftone reproduction that eliminates the screen dots in white areas, often accomplished photographically by the platemaker or by re-etching.
- DRY BRUSH**—Drawing or painting with a brush that contains very little substance to create a textural effect.
- DRY MOUNT**—Mounting photographs without paste or rubber cement.
- DRY MOUNT PRESS**—An electrically heated press that activates an adhesive sheet or foil placed between the image and the illustration board.
- DUCK**—A lead weight used to position a spline while drawing irregular curves.
- DUMMY**—A rough draft or proposal of printed material pasted or bound together in exact reproduction size that show the areas illustration and text will occupy.
- DUOTONE**—Two-color halftone print made from a screened photograph.
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Glossary, Continued

E

EARTH COLORS—Pigments made from earth minerals.

EDGE—The border or outline of a form or shape.

EDIT—To check, add, or delete.

EDIT CONTROLLER—A machine that locates the beginning and end of a scene used for cuing VCRs for presentation.

EGG-OIL TEMPERA—An opaque watercolor similar to egg-based tempura but with an added oil that makes the medium easier to handle and adaptable to a wider range of effects.

EGG TEMPURA—An opaque watercolor paint that uses egg yoke as a binder.

ELECTRONIC IMAGING—The creation, enhancement, and alteration of images through electronic or computer digitization.

ELEVATION—A four-view drawing of a structure showing front, sides, and rear.

ELITE—A type size for typewriters approximating 10 point printing type having 12 characters to the linear inch of copy and 6 lines to the vertical inch.

ELLIPSE—The enclosed plane forming a regular oval where the shortest dimension through the center is the minor axis and the longest dimension is the major axis.

EM—A measure of type equal to the square of the type body, derived from early type practices in which the letter *M* was cast on a square body.

EMPHASIS—Stress or accent on any part of a design or picture.

EMULSION—A suspension of fine drops or globules of one liquid in another liquid.

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Glossary, Continued

- E (Continued)** **EN**—A measure of type equal to one half of an EM.
- ENCRUSTING**—Taking a video image and wrapping it around an image of an object.
- ENGINEERING DRAWING**—An orthographic drawing of a piece of equipment or of its detailed parts containing information and instructions sufficient for manufacture.
- ENGINEER'S SCALE**—A scale used whenever dimensions are in feet and decimal parts of a foot, or when a scale ratio is a multiple of 10.
- ERASING SHIELD**—A small, thin spring metal plate with variously sized and shaped openings used to protect the surrounding area of a drawing while erasing in an adjacent area.
- ESSENTIAL AREA**—The part of a picture that contains all of the title or lettering intended for viewer consumption and often corresponding with the safe title area.
- EQUILATERAL**—Equal angles and equal sides.
- EXPLODED VIEW**—A pictorial view of a device in a state of disassembly, showing the appearance and interrelationship of parts.
- EXPOSURE INDEX**—The degree of light sensitivity of film.
- EXPORT**—The transfer of files to another software application.
- EXTENSION BAR**—A leg extension to a standard compass, which expands the diameter of a circle that the compass is able to draw.
- EXTENSION LINE**—A line used to indicate the extent of a dimension.
- EYE LEVEL**—*Also called* HORIZON LINE. The horizontal plane at the artist's eye level to which that person relates linear perspective.
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Glossary, Continued

F

FACE—*Also called TYPEFACE.* A style of type.

FADE-IN—To bring an image from a pale version into full contrast gradually.

FADE-OUT—To bring an image from a full contrast of darks and lights to a pale version gradually.

FEATHER—A bleeding effect where small featherlike indications surround the characters.

FEATURE—A cartoon panel or strip appearing regularly in a publication.

FELT NIB PEN—A drawing pen with a felt nib or tip that ink soaks through from a reservoir.

FERRULE—The part of a brush that holds the hairs or bristles.

FIGURE—A line illustration or photograph of any kind used in a publication.

FILLS—Color, shades, or patterns added to computer-generated imagery.

FILM NEGATIVE—A photolithographic negative produced by a process camera.

FILM POSITIVE—A film- or acetate-based material having a black area or image and a translucent or clear background.

FILM SPEED—The degree of light sensitivity of film.

FINE ART—The personal expression of the artist who creates it.

FINISHED ART—Any piece of artwork complete or ready for reproduction.

FINISH MARKS—Marks used to indicate the degree of smoothness of the finish on machined surfaces.

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Glossary, Continued

F (Continued)

FIRST GENERATION—Photographically reproduced copy made from the original.

FIX—To spray with a clear coat to protect or preserve an image surface.

FIXATIVE—Any clear solution sprayed or coated on a surface to stabilize, protect, or preserve an image.

FIXER—A solution or chemical that stabilizes the development of photosensitized films.

FLEXIBLE CURVE RULE—A scale or rule that bends in shape to irregular curved surfaces.

FLAKE WHITE—*See* WHITE LEAD.

FLANNEL BOARD—*Also called* FELTBOARD. A presentation board covered in felt or flannel that cut out shapes backed with a slightly abrasive backing will cling to.

FLAPPING—*See* MOUNTING AND FLAPPING.

FLAT BRUSH—A flat oil painting brush that is thicker and with longer bristles than the bright brush;

FLAT COLOR—Color that is dull or grayed or has a matte surface.

FLAT TONE—An area of uniform or even color.

FLIP CARD—One of a series of photographs or drawings shown in sequence to tell a story or deliver a message.

FLOP—To reverse from right to left or vice versa.

FLOPPY DISK—A disk of magnetic oxide that stores electronic data for retrieval by a computer disk drive.

Continued on next page

Glossary, Continued

- F (Continued)** **FLOW CHART**—A chart that shows the flow of data through a data processing system and the sequence of their performance.
- FLOUROGRAPHIC**—*See* DROP-OUT HALFTONE.
- FLUSH**—Even with the margin or the widest line in a column or page.
- FOCAL POINT**—Center of interest.
- FOCAL LENGTH**—The distance from the center of the lens to the film plane.
- FOCI METHOD**—A method of drawing ellipses by plotting a series of points as their circumference using two points on the major axis (foci) as reference and connecting these points with french curves.
- FOCUS**—Image sharpness.
- FOLIO**—A sheet of paper folded once giving four pages.
- FONT**—Typeface designs and sizes.
- FORESHORTEN**—To depict an object or line in less than its true length.
- FORM**—The shape and structure of an object or figure.
- FORMAL BALANCE**—*See* BALANCE or SYMMETRY.
- FORMAT**—A general structure or composition.
- F/STOP**—Settings on the lens diaphragm of a camera lens that measure the amount of light allowed to reach the film.
- F/16 RULE**—Setting the camera for an f/stop of f/16 and the shutter speed close to the ASA/ISO rating of the film.
- FRAME**—A single unit in a storyboard, a cartoon feature, or a film strip.
-

Continued on next page

Glossary, Continued

F (Continued)

FRAME GRABBER—*Also called VIDEO CAPTURE.* A device that isolates one frame of a video image and inputs this frame into a computer.

FREEHAND DRAWING—Drawing without the use of mechanical aids.

FRENCH CURVES—Instruments used to draw smooth, irregular curves.

FRESCO—Painting on freshly spread, moist plaster with pigments.

FRESNEL LENS—A intense prismatic lens of concentric divisions, which concentrate and focus light through a transparent image onto a mirror and to a screen in an overhead projector.

FRISKET—A covering placed over part of a drawing or photograph to protect that section while working on the rest of the artwork.

FRONTISPIECE—An illustration preceding and usually facing the title page of a book.

FULL-COLOR PAINTING—A painting in which the three primary colors or some variation of them is evident.

FULL MEASURE—The entire width of a line of type flush with both margins measured in picas.

FULL SECTION—A sectional view that passes entirely through the object.

FULLER'S EARTH—A fine white powder used for preparing the surface of a photograph to accept retouching.

G

GALLEY PROOF—A rough proof of type made for proofreading, submitted before pages are made up.

GANG RUN—Several different jobs printed simultaneously on a large press in the same colors on one sheet to save time and reduce costs.

Continued on next page

Glossary, Continued

G (Continued)

GANG SHOOTING—Photographing several pages of original copy at the same time.

GELATIN—A pure glue made from animal or vegetable matter.

GENERATION—A single step in a reproduction process.

GIGABYTE—Approximately one billion bytes of information, a kilobyte to the third power (1,024 x 1,024 x 1,024).

GLAZE—An application of a transparent color or value over another color or value.

GLOSSY PRINT—A print having a shiny finish, which does not readily absorb inks or paints.

GLYCERIN—A heavy oil, colorless and odorless, used in the preparation of watercolor pigment.

GOLDENROD—Paper or plastic mask material used to support negatives in making press plates.

GOTHIC—An alphabet or typeface characterized by strokes of equal or almost equal thickness, usually without serifs.

GOUACHE—An opaque watercolor.

GRADED WASH—A wash that blends a light tone to a dark tone or vice versa.

GRADUATED FILL—To fill with color, shade, or pattern that variegates from dark to light or vice versa.

GRAPHIC ARTS—A form of art specializing in work prepared primarily for conveying information.

Continued on next page

Glossary, Continued

G (Continued)

GRAPHIC INTERFACE—Screen graphics on the computer screen that make the computer easier to use.

GRAPHICS PRINTER—A high-resolution printer capable of printing graphic images.

GRAPHICS TABLET—An electronic input device that allows the user to draw on the tablet before committing the image to memory.

GRAPHITE—The black marking substance in a lead pencil.

GRAVER—A needle or square pointed tool used to scratch lines into scratchboard.

GRAVURE—A photomechanical printing process (intaglio) with the images recessed below the surface of the plate.

GRAY—A color formed by mixing black and white or complementary colors.

GRISAILLE—A decorative gray monochromatic painting designed to create the illusion of a bias-relief sculpture.

GUM ARABIC—A water soluble gum used as a binder in some watercolors and tempura paints.

GUTTER—(1) The inner margin of a printed page extending from the printed portion to the fold or binding; (2) The area between two columns on a printed page.

H

HALF SECTION—A combination of an orthographic projection and a section view to show two halves of a symmetrical object.

HALFTONE—A tonal pattern of shades from white through black defined by a series of dots.

Continued on next page

Glossary, Continued

- H (Continued)** **HALFTONE SCREEN**—A screen placed in front of the negative material in a process camera to break up a continuous-tone image into a dot formation.
- HARD COPY**—Copy of any kind produced on paper or any substrate except film, used for proofing, checking, revising, or redrawing.
- HARMONY**—A pleasing arrangement of the picture elements, because of the similarity of one or more qualities.
- HEXAGON**—A six-sided figure.
- HIDDEN LINE**—Thick, short dashed lines used to show a hidden part or edge.
- HIGHLIGHT HALFTONE**—*See* DROP-OUT HALFTONE.
- HIGH SURFACE**—*See* HOT PRESSED.
- HINGE JOINT**—A joint limited to back-and-forth movement.
- HOLDING LINE**—A line usually drawn in black on a mechanical intended for reproduction.
- HOOK AND LOOP BOARD**—A briefing board covered with nylon hook material to which items backed with a nylon loop material will stick.
- HORIZON LINE**—An imaginary horizontal line representing the observer's line of sight.
- HOT PRESSED**—*Also called* HIGH SURFACE. A smooth art paper or illustration board.
- HUE**—The name given to distinguish any color.
- HYPOT**—*See* SODIUM THIOSULFATE.
-

Continued on next page

Glossary, Continued

I

ICON—Onscreen computer symbols that portray functions by graphic images.

ILLUMINATION—The hand decoration of text in a book, a manuscript, or a diploma.

ILLUSTRATION—A picture designed to interpret a story or an article.

ILLUSTRATION BOARD—Heavy paper board manufactured especially for artists available in a variety of sizes, surfaces, and weights.

IMAGE AREA—An area that encompasses a printed, drawn, or photographed image and the light or dark background space around the image.

IMPORT—The transfer of files from other software applications.

INDEFINITE BLENDING—Adding paint or ink to a wet surface to promote indefinite effects.

INDIA INK—Pigment made of lampblack and a binder suspended in water as a fluid ink.

INFINITY—The farthest distance marking on a lens.

INFORMAL BALANCE—*See* BALANCE.

INK JET PRINTER—A high-resolution printer that uses a minute jet spray of ink to create an image.

INPUT—Text or parameters entered into a computer memory or saved on disk.

INPUT DEVICE—*See* KEYBOARD or JOYSTICK. An accessory used to provide text or commands into a computer or disk.

INSCRIBED—An object completely enclosed by another.

Continued on next page

Glossary, Continued

- I (Continued)**
- INTAGLIO**—Printmaking from engraved or etched lines and surfaces.
- INTENSITY**—The degree of strength, saturation, or purity of a color.
- INTERFACE**—Interaction between accessories.
- INTERMEDIATE**—A copy of an original on translucent or transparentized film, paper, or cloth, which now becomes a master to make other copies.
- IRREGULAR CURVES**—Curvilinear forms that do not contain arcs easily replicated by a compass or circle template.
- ISOMETRIC PROJECTION**—A set of three or more views of an object that appears rotated, giving the appearance of viewing the object from one corner.
- ITALICS**—Letters whose form has an oblique slant to the right or left.
- IVORY BLACK**—A fine black pigment.
-

- J**
- JOYSTICK**—*See* TRACKBALL or MOUSE. A computer input device used for remote manipulation of a cursor.
- JUSTIFICATION**—Spacing within the line of type of a predetermined measure to align the margins.
- JUXTAPOSITION**—Side-by-side placement for a desired effect.
-

- K**
- KERN**—Part of a letter that appears as a hairline connection between adjacent letters.
- KERNING**—The addition of space between characters.
- KEY**—A scale of values, tones, or hues.
- KEY ART**—*See* BLACK ART.
-

Continued on next page

Glossary, Continued

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- K (Continued)**
- KEY LINE**—A line drawn in red on a mechanical to indicate position and size of a piece of copy that will not be visible in the reproduction.
- KEYBOARD**—A computer input device based on the principle of a typewriter keyboard used to input text and commands into a computer.
- KEYSTONE EFFECT**—Onscreen distortion created when the projector is not parallel to the deck or screen surface.
- KID FINISH**—A medium-textured surface of art paper or illustration board.
- KILOBYTE**—Abbreviated as K, a kilobyte is 1,024 bytes of data.
-
- L**
- LAMINATE**—(1) A transparent plastic or acrylic cover material; (2) To cover a surface with a transparent plastic or acrylic material.
- LAMINATION**—A plastic or acrylic used to cover a surface.
- LAMPBLACK**—A very fine black pigment used in various black paints and inks.
- LASER**—An acronym for Light Amplification by Stimulated Emission of Radiation.
- LASER PRINTER**—A high-resolution printer that uses laser technology to create an image.
- LAYING IN**—The initial broad application of tone to a picture.
- LAYOUT**—The arrangement of a book, a magazine, or other publication so that text and illustrations follow a desired format.
- LEADING**—Spacing between lines of type, measured in points.
- LEADER LINE**—Thin, unbroken lines used to connect numbers, references, or notes to appropriate surfaces.
-

Continued on next page

Glossary, Continued

L (Continued)

LEAF—A single sheet that includes both sides.

LEAK—An accidental escape of fill color or texture from an object or shape not completely enclosed by pixels.

LENS—Optical glass components arranged in a formation that creates a focal point at a specific distance from a screen.

LENS DIAPHRAGM—Controls the amount of light allowed to reach the film.

LEGEND—A description of any special or unusual marks, symbols, or line connections.

LENTICULAR SCREEN—A projection screen with a surface patterned to reflect a projected image with minimum glare.

LETTERHEAD—(1) The printed matter, usually the name and address of a company, at the head of a sheet of letter-quality paper; (2) A sheet of paper bearing a letterhead.

LETTERING—Letters and words formed or printed by hand.

LETTERPRESS PRINTING—A printing process in which the raised, inked surfaces of the type and/or plates transfer an impression directly to the paper.

LETTER-QUALITY PRINTER—A printer that imitates letters with resolution similar to a typewriter.

LETTERSPACING—Placing additional space between the letters of words to expand the length of a line or to improve and balance typography.

LIFT METHOD—(1) The process of using laminate material to remove or lift an image from clay-coated stock; (2) scanning text or graphics onto disk for importation to another application.

Continued on next page

Glossary, Continued

- L (Continued)**
- LIGHT BOX**—A box with a translucent glass or plexiglass top illuminated from underneath, used for tracing and layout.
- LIGHTFACE**—The lightest and thinnest form of a type series.
- LIGHT PEN**—An electronic input device used to draw freehand against a CRT screen.
- LIMITED PALETTE**—(1) A palette with a restricted number of pigments; (2) A palette that lacks one or more of the three primary colors.
- LINE**—A continuous, unbroken mark made by a pen, a pencil, a brush, or other drawing instrument.
- LINE AND WASH**—A technique combining a black line with transparent wash.
- LINE COPY**—A composition of black lines and masses without gradation of tone.
- LINE DRAWING**—A drawing composed entirely of lines, dots, and areas of solid black.
- LINE OF DIRECTION**—The line the eye follows when looking at the picture.
- LINES PER INCH**—*Also called* LPI. A standard measurement of resolution for the color printing trade.
- LINE WEIGHT**—The thickness of pencil, ink, or other lines in artwork.
- LINSEED OIL**—An oil obtained by pressing the seeds of a plant, which produces linen fiber used as a medium in oil painting.
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Continued on next page

Glossary, Continued

L (Continued)

LITHOGRAPHY—*See* OFFSET PRINTING or OFFSET LITHOGRAPHY.

A reproduction process in which grease crayon lines and masses drawn on a flat, polished stone print through the affinity of grease to grease (grease crayon and printer's ink). The wetted stone repels the ink from the other areas not covered with crayon.

LITHOGRAPHIC PENCILS—An oily pencil or crayon used to mark lithographic plates.

LOCAL COLOR—The actual color of an object without regard to the effect of changing light and shadow conditions.

LOCAL COLOR VALUE—The actual lightness or darkness of a color without regard to the effect of changing light and shadow conditions.

LOGOTYPE—*Also called* LOGO. The lettered signature, nameplate, or trademark of a commercial firm.

LONGSHOT—A picture showing a full figure or a distant view.

LACEY LUCY—*See* CAMERA LUCIDA.

M

MACHINE COMPOSITION—Type set by a machine.

MACRO LENS—A short focal-length lens specifically designed to allow closeup photography.

MAHLSTICK—A rod used in the palette hand to support or steady the painting hand.

MAKEUP—*See* LAYOUT. The arrangement of text and illustrations on a page in conformance to standard practices in the industry or to publication requirements.

MAGNETIC CHALKBOARD—A briefing board that accepts chalk markings and magnetic attachments.

Continued on next page

Glossary, Continued

M (Continued) **MARS COLORS**—Artificial earth colors.

MASKING—To block out a portion of an illustration by pasting paper over it to prevent it from reproducing.

MASKING TAPE—An opaque, paper tape used to cover the edges of a picture while painting and to fasten artwork temporarily to a drawing board.

MASTER—An original typed, drawn, or typeset copy intended for reproduction.

MAT—A cardboard or paper decorative enclosure around a picture.

MATCH DISSOLVE—Holding one element on a screen as one scene dissolves into another.

MATTE—Dull or without shine.

MATTE PRINT—A print having a dull finish.

MATTE SCREEN—A projection screen with a dull surface to reduce glare from overhead lights.

MEASURE—The length of a line of type measured in picas.

MEATBALL—*See* **BULLET**.

MEDIA INTEGRATION—*Also called* **MULTIMEDIA**. Mixing various presentation devices in the same presentation.

MECHANICAL—A page or layout prepared as an original for photomechanical reproduction.

MECHANICAL DRAWING—A method of drawing using precision tools to produce mathematically precise layouts, diagrams, and engineering drawings.

Continued on next page

Glossary, Continued

- M (Continued)** **MEDIUM**—(1) A liquid that dilutes a paint without damaging its adhesive; (2) The mode of expression employed; (3) The actual instrument or material used by the artist.
- MEGABYTE**—Abbreviated MB or M, approximately one million bytes of data.
- MEMORY**—That portion of computer hardware that retains data for later retrieval.
- MENU**—A selection of options displayed on a computer screen.
- MICROCOMPUTER**—Another name for a personal computer or computer workstation not attached to a mainframe system.
- MILITARY STANDARDS**—*Also called* MIL-STD. A formalized set of government standards.
- MIXED MEDIUM**—*Also called* MIXED MEDIA. A combination of two or more mediums.
- MODEM**—An electronic input/output device that connects computer workstations for communications. An acronym for the word modulator and demodulator.
- MOIRÉ**—An wavy or checkered pattern that results when photographing a halftone through a screen.
- MONOCHROMATIC**—Shades or tints of one color.
- MONTAGE**—*See* COMPOSITE. (1) Arranging a number of pictures or designs in a combination, often with some overlapping, so that they form a composite whole; (2) The resultant arrangement or composition.
- MONITOR**—The viewing screen of a computer system.
- MOOD**—An outward projection of a feeling or emotion that affects behavior communicated by action, situations, or symbology in a picture.
-

Continued on next page

Glossary, Continued

M (Continued) **MORGUE**—*See* PICTURE MORGUE, CLIP ART, or RESEARCH FILE.

MOUNT—To fasten onto another surface.

MOUNTING AND FLAPPING—Fastening original artwork or copy to a board allowing sufficient excess around the picture borders to accommodate attaching a protective overlay along one side.

MOUNTING BOARD—Heavy paper boards used as backboards to support drawings, paintings, and photographs.

MOUSE—A hand-held computer input device that allows rapid movement and selection.

MULTIMEDIA—*Also called* MEDIA INTEGRATION. A combination of presentation devices used in the same presentation.

MULTIPURPOSE BOARD—A briefing board with a slick, bright, white surface that accepts erasable marker, marker, and magnetic backed accessories.

MUNSELL COLOR SYSTEM—A system of color analysis and identification that distinguishes between the three measurable dimensions of hue, value, and chroma (intensity).

MURAL—Any picture painted or fixed permanently on a wall or ceiling.

MYLAR—Tough, highly stable, polyester film used as a base for engineering drawings, laminating, overlays, and a wide variety of other applications.

N **NARRATION**—*Also called* VOICE OVER. The description or commentary that accompanies television and video presentations.

NCR PAPER—No Carbon Required paper; chemically coated paper that transfers a copy of an image to the sheet directly behind it without the use of a carbon.

Continued on next page

Glossary, Continued

N (Continued)

NEGATIVE, PHOTOLITHOGRAPHIC—A film negative having a translucent image and a black background produced by a process camera and used primarily to make printing plates.

NEUTRAL COLOR—(1) A color that lacks hue and intensity; (2) A color that contains some amount of its complementary; (3) An earth color.

NIB—A point at the end of a pen or marker.

NOISE—Adding a random pattern of pixels over an image to add texture, create a new value, or give a painterly effect.

NORMAL LENS—*Also called* STANDARD LENS. A 50mm focal-length lens, which most closely approximates normal vision with minimal distortion.

O

OBLIQUE PROJECTION—A view produced when the projectors are at an angle to the plane of the object illustrated.

OCTAGON—A figure having eight sides.

OFFSET LITHOGRAPHY—*See* LITHOGRAPHY. Lithographic printing where an inked plate prints on a rubber blanket, which then offsets the image to paper stock.

OFFSET SECTION—A section view of two or more planes in an object to show features that do not lie in the same plane.

OIL PAINT—Any pigment ground in linseed oil or poppy oil.

OILSTONE—A stone or abrasive used to sharpen needlepoints and blades.

ONE POINT PERSPECTIVE—*Also called* PARALLEL PERSPECTIVE. When the height and width of an object are parallel to the plane of projection.

ONION SKIN—*Also called* MANIFOLD PAPER. Thin, translucent paper used to make a typewriter carbon copy or to serve as a tissue overlay for work requiring correction or protection.

Continued on next page

Glossary, Continued

- O (Continued)** **ONSCREEN**—An image that appears on the computer or television screen.
- OPAQUE**—(1) Impermeable to light; not transparent or translucent; (2) To paint over unwanted portions of a negative with a solution to prevent light from seeping through.
- OPAQUE PROJECTOR**—A device that projects an opaque object to a desired size on another surface.
- OPAQUE WATERCOLOR**—*See* WATERCOLOR. A creamy, opaque paint-like gouache or tempura, available in tubes, jars, or by mixing white with transparent colors.
- OPAQUING**—Covering up with opaque paint.
- OPTICAL CENTER**—A point slightly above (10%) the geometric center of a layout that the eye perceives as the center.
- OPTICAL ILLUSION**—An unreal or misleading image perceived by the eye as real.
- OPTICAL SPACING**—The arrangement of spacing between letters for legibility and appearance, which varies with the shape of the letters to achieve optical equalization.
- ORGANIZATION CHART**—A block chart or diagram showing the names, titles, departments, and responsibilities of personnel in an organization.
- ORIGINAL**—*See* MASTER. Copy submitted to the printer for reproduction.
- ORTHOGRAPHIC PROJECTION**—A method of projection with six principal views.
- OSCILLATING AIRBRUSH**—An airbrush with a reciprocating needle used for fine detailed work.
-

Continued on next page

Glossary, Continued

O (Continued)

OUTPUT—The end product generated by an electronic device, such as a computer, printer, or copier.

OUTPUT DEVICE—An electronic accessory to a computer system that provides some type of end product either visually or as a hard copy.

OUTLINE—The outside edge of a shape or form.

OUTLINE DRAWING—A drawing where lines define the outer limits of the forms without the representation of modeling, light, or shadow.

OVERHEAD PROJECTION—A projector that uses of a system of mirrors and a fresnel lens to project a transparent image or object to another surface or screen.

OVERLAP—To cover a part of one shape or line with another.

OVERLAY—A transparent or translucent sheet taped over the original art for protection or to indicate instructions or corrections.

OVERPRINTING—Printing an image over another impression.

OZALID MACHINE—An ammonia process printmaking machine that produces the same—size copy from transparent or translucent originals.

P

PAINTING KNIFE—*See* PALETTE KNIFE. A type of palette knife made for applying paint to a picture.

PALETTE—(1) The surface on which the artist places paint and mixes colors before applying them to canvas or other painting surface; (2) A group of colors or gray values chosen for use in the same picture.

PALETTE KNIFE—A thin, flexible, steel blade set in a wooden or plastic handle available in a variety of shapes used for mixing paints and impasto, applying paint directly to a canvas or to create special textures directly on the surface of a picture.

Continued on next page

Glossary, Continued

P (Continued)

PALETTING—Moving the pigment back and forth across a palette with a paint brush to achieve a certain consistency in texture or color or to load the brush with pigment adequately.

PANEL—(1) A given area in which a cartoon is drawn, with or without a defined frame; (2) One box or frame of a comic strip; (3) One unit of a storyboard.

PANORAMA—*Also called PAN.* Slow, steady camera movement from side to side.

PANTOGRAPH—A mechanical device based on the shape of a parallelogram, used to reduce, enlarge, or copy pictures.

PANTONE COLOR SYSTEM—An industry accepted system of color analysis and identification that distinguishes between the three measurable dimensions of hue, value, and chroma (intensity).

PARABOLIC REFLECTORS—Lamp reflectors that assist even illumination and shorten exposure time.

PARALLAX—Distortion present when exposing film through a lens not aligned with the viewfinder, distortion corrected by a rangefinder camera.

PARALLEL PROJECTION—*See ONE POINT PERSPECTIVE.*

PARALLEL STRAIGHTEDGE—A long, straight edge supported at both ends to maintain parallel motion.

PARTIAL SECTION—A sectional view consisting of less than a half section.

PASTEL—(1) A dry pigment mixed with a variety of binders to form a stick or crayon for application to a picture surface; (2) A picture executed in the pastel medium.

Continued on next page

Glossary, Continued

- P (Continued)**
- PASTE-UP**—The process of pasting an image or part of an image on a reproduction page or sheet before photographing for platemaking or printing.
- PATTERN**—(1) The regular or irregular distribution or arrangement of elements; (2) Regularly repeated flat designs used to create two-dimensional textures.
- PENS, PLOTTER**—A pen nib or jet spray attached to a plotter output device.
- PENS, STEEL BRUSH**—Steel pen nibs designed to create large poster size lettering.
- PENS, TECHNICAL**—Conical or tubular tipped pen nibs designed to produce a consistently even line of a predetermined weight in a standard or metric measurement available with and without a reservoir.
- PENTAGON**—A five-sided figure generally having equal sides and angles.
- PERCENTAGE CHART**—*Also called* **PIE CHART**. A circular chart divided into wedges whose sum equals 100% or 360°.
- PERPENDICULAR**—A vertical line meeting or intersecting a horizontal line at 90°.
- PERSONIFICATION**—Attributing human qualities to animals or inanimate objects.
- PERSPECTIVE**—The visual impression of lines moving closer together as distance increases.
- PHANTOM LINES**—*Also called* **ALTERNATE POSITION LINES**. Lines consisting of one long and two short dashes, evenly spaced, terminating in a long line, used to indicate an additional position of a part or object.
-

Continued on next page

Glossary, Continued

P (Continued)

PHANTOM VIEW—A view showing an alternate position of a movable object.

PHOTOGRAPHIC TYPESETTERS—*See* TYPESETTERS, PHOTOGRAPHIC.

PHOTOLETTERING—A method of simulating hand lettering or display type by photographic means.

PHOTO LITHOGRAPHY—The transferring of a drawing to a lithographic plate by photography.

PHOTOMECHANICAL—Pertaining to any process of printing or duplicating images by mechanical means from a photographically prepared printing plate.

PHOTOSTAT—*Also called* STAT. A photographic image recorded by a camera so constructed that it photographs and develops directly on paper, in negative values.

PHOTOTYPE—Type set by photographic means.

PICA—A unit of measure equal to 12 points or 1/6 of an inch.

PICKUP—A square of gum rubber used to remove excess rubber cement.

PICTORIAL DRAWING—Any drawing that depicts an object with recognizable clarity.

PICTURE AREA—The flat surface within the borders of a picture.

PICTURE MORGUE—*Also called* MORGUE. *See* CLIP ART.

PICTURE PLANE—An imaginary plane placed between the observer and the object, usually at right angles to an observer's line of vision.

PIE CHART—*See* PERCENTAGE CHART.

Continued on next page

Glossary, Continued

P (Continued)

PIGMENT—Dry color matter that becomes paint when mixed with a vehicle or binder.

PINHOLE—A small light spot that appears on a developed photographic negative resulting from particles of dust and lint on the unexposed negative, the camera lens, the vacuum board glass, or other parts of the camera.

PIN REGISTER—A method of holding elements in place in overlay work and animation.

PIXEL—*Also called* PICTURE ELEMENT. A small bit of digital data from a computer screen.

PIXEL MAP—*Also called* BIT MAP. A matrix of pixels that form a digital image on the computer screen.

PIXILATED—Having jagged edges.

PIXEL—Specifying the size of a pixel on the computer screen.

PLAIN TITLE CARD—Printed information only on a card for television transmission of credit lines.

PLAN VIEW—A view of an object or area as it would appear if viewed from directly above.

PLANE—A flat surface.

PLANNING CARDS—A small card containing a idea or point placed in sequence on a storyboard.

PLAT—A map or plan view of a lot showing principal features, boundaries, and location of structures.

PLATE FINISH—A smooth surfaced paper.

PLY—A single layer of drawing paper.

Continued on next page

Glossary, Continued

- P (Continued)** **POINT**—A standard type measure of 1/72 of an inch or 72 points equals 6 picas.
- POLYMER**—Paints that have polyvinyl acetate or acrylic resin as a binder used as either a transparent or opaque medium.
- POLYGON**—Common geometric constructions.
- PORTRAITURE**—The process or art of depicting an individual by drawing, painting, or photographing from life.
- PORTRAY**—To delineate or depict.
- POSTER**—A large cardboard or paper display sign.
- POSTER BOARD**—A medium weight cardboard suitable for show cards.
- POSTER COLOR**—An opaque watercolor used for making show cards.
- POSTERIZATION**—A technique for adding poster-like qualities to a photograph, a film, or an illustration by separating the normal tones of a subject into distinctly separated, strong tones.
- POUNCE**—A powdered substance that improves the ink-absorbing qualities of tracing cloths and papers.
- PRELIMINARY DRAWINGS**—Drawings done in preparation for a finished piece of art.
- PRE-PRESS**—The preparatory stage of art or copy immediately before committing the image to a plate.
- PRIMARY COLORS**—The red, yellow, and blue in a subtractive process and the red, yellow, and green in the additive process of color theory.
- PRINT**—An image made from a master negative or plate.
-

Continued on next page

Glossary, Continued

P (Continued)

PRINTING—A process for reproducing copy.

PRINTING PLATE—*Also called CUT.* A flat piece of metal used on a printing press that contains the image either engraved or etched photographically on the surface.

PRISM—A transparent piece of crystal or optical glass having two plane surfaces which are not parallel that separate white light into the visible colors of the spectrum.

PROCESS COLOR REPRODUCTION—A combination of halftone plates, usually red, yellow, blue, and black, which when printed in perfect register, combine to produce a full-color reproduction.

PRODUCTION DEPARTMENT—The people responsible for purchasing and maintaining schedules on printing, typography, engravings, bindings, paper, and sometimes the purchase of art for an organization.

PROGRESSIVE PROOFS—Proofs showing the order of printing and shade of ink for each required plate.

PROGRESSIVE DISCLOSURE—Systematically revealing information on a partially obscured visual.

PROJECTION—The act or art of projecting lines and planes in orthographic and perspective drawings.

PROJECTOR—A device containing a light and lenses for projecting an image onto another surface.

PROJECTURAL—(1) An image projected onto another surface; (2) The image so projected.

PROOF—A printed impression from a negative, a plate, or a body of type submitted for examination or correction.

Continued on next page

Glossary, Continued

P (Continued) **PROOFREADER'S MARKS**—Standard marks placed in the margin nearest the word that indicate corrections in typeset copy.

PROPORTION—The relation to size of one part or thing to another or one portion of something to the whole.

PROPORTIONAL DIVIDERS—A drafting instrument used for transferring measurements from one scale to another or to divide lines and circles into equal parts.

PROPORTIONAL SPACING—*Also called* DIFFERENTIAL LETTERSPACING. The spacing of characters in proportion to size by means of the typewriters and office composing machines used in the preparation of cold composition copy.

PROPS—Accents or accessories that identify the time frame or location of a subject.

PROTRACTOR—A circular or semicircular rule for measuring off the degree of an angle.

Q **QUILL PEN**—*See* CROW QUILL. A pen nib made from a feature quill.

R **RADIAL FILL**—To fill an object with color, pattern, or shade that appears to radiate from the center of the object.

RADIATION—A divergence of lines, tones, or colors from a common point to different directions.

RADIUS—A straight line from the center of a circle or sphere to a point on its circumference.

RADIUS CURVE—A drawing tool used to draw arcs of a predetermined radius.

Continued on next page

Glossary, Continued

R (Continued)

RANDOM ACCESS MEMORY—*Also called* RAM. Retrievable computer memory accessible at will without sequential reading.

RANGEFINDER—The ground glass in a camera used to focus an image.

RASTER-BASED—An image based on the manipulation of a matrix of pixels or dots.

RASTER IMAGE PROCESSOR—*Also called* RIP. A device for converting vector-based imagery to high-resolution raster images.

READ—To access electronically stored data.

REAR PROJECTION SCREEN—A matte surface, translucent screen used when projecting an image from behind to a screen.

REBOOT—Restart the computer system.

RECEDING COLORS—Colors that appear to move away or create the illusion of distance.

RECTANGULAR COORDINATE GRAPH—A graph based on a grid system where values are plotted by X and Y coordinates.

REFERENCE NUMBERS—Numbers used on one drawing to refer to another drawing for further details.

REFERENCE PLANE—The normal plane used to reference all information.

REGISTER—To align a page or any elements of an image or impression to match the position of successive impressions.

REGISTER MARKS—Marks used to key an overlay to a drawing or mechanical as in color separation or combination plates.

REMOVED SECTION—A drawing of the internal cross section of an object located near the basic drawing of the object.

Continued on next page

Glossary, Continued

- R (Continued)** **RENDER**—To represent, portray, or depict in a drawing or painting.
- RENDERING**—A drawing or painting in which tonal values vary from white through black or from light to dark shades.
- REPRODUCIBILITY**—The ability of line and halftone copy to reproduce as acceptable and legible.
- REPRODUCIBLE ART**—Second-generation art made from the original art and mortised or pasted onto the reproduction page.
- REPRODUCTION**—Making one or more copies of an original piece of work.
- REPRODUCTION COPY**—*Also called* CAMERA-READY COPY. Copy ready in all respects for photomechanical reproduction.
- REPRODUCTION PROOFS**—*Also called* REPROS. Exceptionally clean, sharp proofs on a highly coated paper used for reproduction.
- REPROGRAPHICS**—The reproduction of images by copying machines and their methods and processes.
- RESCALE**—To enlarge or reduce in size or to change in shape without changing proportion to fit new space configurations.
- RESEARCH FILE**—*See* MORGUE, PICTURE MORGUE, or CLIP ART.
- RESOLUTION**—Clarity, focus, or density.
- RETOUCH**—To delete unwanted image areas or make repairs to copy by painting out with an opaque solution.
- RETOUCH GRAYS**—A series of opaque watercolors ranging from white to black.
-

Continued on next page

Glossary, Continued

- R (Continued)** **RETOUCHING**—The alteration of detail or removal of spots and blemishes in a photographic print or negative.
- RETOUCH VARNISH**—A light, colorless varnish sprayed on a dull, dried-out area or an unfinished oil painting to restore the “wet” colors or values, making it easier to mate with new paint.
- REVERSE**—*See* FLOP. To turn over.
- REVERSAL**—*See* REVERSE PRINT.
- REVERSE PRINT**—A print where the black values of the originals are white.
- REVISION BLOCK**—Space located in the upper-right corner of a drawing to record any changes to the original drawing.
- REVOLVED SECTION**—A drawing of the internal cross section of an object superimposed on the basic drawing of the object.
- ROMAN**—One of a group of alphabets or typefaces characterized by thick and thin strokes and often with serifs.
- ROSS BOARD**—An illustration board that comes in a variety of roughened surfaces that divide crayon or brush strokes into broken textures suitable for reproduction.
- ROTATION**—A view in which the object is rotated or turned to reveal a different plane or aspect.
- ROUND BRUSH**—A cylindrical brush having an evenly tapered point.
- RUBBER CEMENT**—Semitransparent glue consisting of gum rubber and a petroleum or benzol solvent.
- RUB-ONS**—Transfer sheets containing reprinted characters, symbols, and numerals applied by burnishing over an acetate or paper back sheet.
-

Continued on next page

Glossary, Continued

R (Continued) **RULING PEN**—An instrument that holds ink between two adjustable blades.

RUNNING HEAD—The title repeated at the top of consecutive pages in a book or magazine.

S **SABLE BRUSH**—A flat or round-shaped brush made from the tail hair of a Kolinsky (Asiatic) mink.

SAFELIGHT—A colored light used to illuminate a darkroom without harming photosensitive film or paper.

SANDPAPER PAD—A pad of sandpaper sheets mounted on a strip of wood used to sharpen a pencil lead or pastel.

SANS SERIF—Without serifs, a letter that does not have a finishing stroke.

SATURATION—The purity or intensity of color.

SCALE—(1) Proportions or relative dimensions; (2) To enlarge or reduce without changing the original proportions.

SCALE CLIP—A clip attached to a scale that focuses on the scale currently in use.

SCALE DRAWING—A drawing that shows relative sizes and proportions.

SCALING—*Also called* DIMENSIONING or SIZING. Enlarging or reducing copy or an image to the correct dimensions to occupy a given area.

SCANNING AREA—The total area or picture that the camera sees.

SCRAP FILE—*See* RESEARCH FILE.

SCRATCHBOARD—A type of illustration board with a chalky surface uniformly covered with ink.

Continued on next page

Glossary, Continued

- S (Continued)** **SCREEN**—A glass plate or film with crosshatched lines that photographically produces a halftone for reproduction from a continuous-tone original.
- SCREEN PROCESS PRINTING**—*Also called SILKSCREEN.* A form of stencil printing that uses silk, nylon, or metal screen to contain the image.
- SCREEN REFRESH**—A continuous update of computations that create the image on a computer screen.
- SCRIPT**—(1) Lettering based on hand writing; (2) A paper or papers that describe in detail all of the elements of a commercial or story.
- SCROLL**—A rapid up-or-down movement of a computer screen image during a search function.
- SECONDARY COLORS**—The colors (orange, green, and violet) that lie halfway between the three primary colors.
- SECTION LINE**—Thin, diagonal lines used to indicate the surface of an imaginary cut in an object.
- SECTIONAL VIEW**—The view obtained by cutting away part of an object in an illustration to show the shape and construction of the interior.
- SEPIA**—A dark, warm brown color of low brilliance.
- SEPIA INTERMEDIATE**—An intermediate used in making duplicate transparencies by the whiteprint process.
- SERIF**—The finishing stroke or line projecting from the end of the main stroke of many letters in some typefaces.
- SET PALETTE**—One hue mixed with a group of colors to create color harmony or unity in a chosen palette.
-

Continued on next page

Glossary, Continued

- S (Continued)** **SETTING**—Background or surrounding.
- SHADE**—A mixture of pure color and black.
- SHADING**—Lines, values, or color applied to create form, shadow, or pattern.
- SHADING MEDIUMS**—Preprinted tones and patterns used to enhance the appearance of copy and artwork.
- SHADING SHEETS**—Sheets of cellophane or acetate preprinted with tones and patterns with a low—tack adhesive for applying to artwork.
- SHAPE**—The flat silhouette or two-dimensional form of an object.
- SHELF LIFE**—The length of time before sensitized material deteriorates.
- SHIP'S CURVES**—Instruments for drawing elongated, irregular curves that closely approximate the curves found in shipbuilding.
- SHUTTER SPEED**—A method of controlling the length of time that light can reach a film.
- SIGHT LINE**—An imaginary line extending from the eyes of a figure in a drawing to an object indicating that person's direction of glance.
- SINGLE-ACTION AIRBRUSH**—A device that releases both air and pigment by pressing down on a button.
- SIGNATURE**—A sheet of paper printed on both sides and folded to make up part of a publication.
- SILHOUETTE**—An outline of an object or figure filled in solidly without indication of modeling or surface structure.
- SILKSCREEN**—A method of printing through a stencil fixed to a screen of natural or synthetic fiber or metal mesh.
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Continued on next page

Glossary, Continued

- S (Continued)** **SIZE**—*Also called* SIZING. Various gelatinous materials made from starch, clay, glue, and casein used for glazing or coating papers and cloths.
- SKETCH**—A quickly executed drawing as a preparation toward more finished work.
- SKETCHING PENCIL**—*See* CARPENTER'S PENCIL. A soft-leaded pencil used for freehand sketching.
- SMALL CAPS**—Capital letters smaller than the standard capitals of a typeface and the size of the body of the lowercase letters.
- SODIUM THIOSULFATE**—*Also called* HYPO. A salt with water solution that dissolves the silver halides used in photographic papers and films.
- SOFT EDGE**—A blended or graduated transition from one value or color to another.
- SOFTWARE**—Computer programs that direct the output devices and determine the input devices effectivity.
- SPECIAL EFFECTS GENERATOR**—A device that adds or creates effects to visual images during recording on videotape.
- SPECIAL IRREGULAR CURVE**—Irregular curves for a specific purpose, such as ship's curves, mechanical engineer's curves, conic sections, logarithmic spirals, and flexible curve rules.
- SPECTRUM**—The arrangement of colors side-by-side as refracted by a prism.
- SPEEDBALL PENS**—Lettering and drawing pens manufactured by the Hunt Manufacturing Company that are the hallmark of hand lettering pen nibs.
- SPEED LINES**—Extra lines following a moving figure or object in a cartoon representing the disturbance the movement causes in the atmosphere.
-

Continued on next page

Glossary, Continued

S (Continued)

SPHERE—A form where all points are equidistant from the center.

SPINE—The bound edge of a book.

SPLINE—A flexible rule, held in place by lead ducks, used to draw irregular curves.

SPLIT BRUSH TECHNIQUE—*Also called DRY BRUSH TECHNIQUE.* Painting or drawing with a brush having the hairs separated to form more than one point.

SPLIT COMPLEMENT—A color scheme that uses a key hue with the two colors that lie adjacent to its opposite on the color wheel.

SPLIT FIELD—A rangefinder that focuses an image by dividing the image in half and requiring alignment into a whole.

SPOT COLOR—Using a combination of two individual colors, a main color, usually black, and an accent color instead of a full-color output.

SQUEEGEE—(1)An implement used on silk process printing presses that forces ink and ink compounds through the screen and stencil onto a printing surface to form the image; (2) The process of forcing pigment across a surface with other than a brush.

STABILIZER—A chemical that arrests the continued development of an image and fixes that image into the surface.

STABILO PENCIL—A pencil that uses grease or wax as a binder for pigment and is capable of writing on glass.

STAT—*See* PHOTOSTAT.

STATIC—Lacking in movement.

STATION POINT—The point of observation in the making of perspective drawings.

Continued on next page

Glossary, Continued

S (Continued)

STILL LIFE—A pictorial arrangement of inanimate objects.

STIPPLE—The effect obtained by using a series of dots or flicks in drawing.

STOCK—Material printed or worked on by printers or artists.

STOP BATH—A chemical solution that stops photographic development.

STOPPER—An eye-catching device in a picture that grabs and holds a viewer's attention.

STORYBOARD—A panel presentation of rough sketches of a proposed series of views.

STRAIGHTEDGE—An instrument with long, straight edges.

STRIP IN—To position copy not pasted up on the mechanical before platemaking.

STRIPPING—Cutting out and placing in position.

STUDIO CARD—Illustration or pictorial information on a card intended for television transmission.

STUMP—A pencil-shaped roll of paper used to blend pastel, pencil, and charcoal.

STYLIZED—Characterized by an emphasis on style and design.

STYLUS—A scraping instrument with sharp or chiseled edge.

SUBHEAD—A secondary headline or title.

SUBTRACTIVE COLOR PROCESS—The process of forming colors by mixing pigments.

Continued on next page

Glossary, Continued

S (Continued)

SUBORDINATION—Subduing part of a picture to make it less important than another part.

SUPERIMPOSED—*Also called* SUPER. One image or text placed over another without totally obscuring the first.

SUPERIMPOSED IMAGE—A rangefinder that focuses an image by requiring the alignment of two images over each other.

SUPPORT—The reinforcement or backing for a painted surface.

SURREALISM—An art movement whose objective is to explore the realm of unconscious emotion and dreams.

SWATCH—A small sample specimen.

SWEDE PEN—A broad nibbed, adjustable ruling pen.

SWIPE FILE—*See* RESEARCH FILE.

SYMBOL—A visual element that represents something else.

SYMMETRY—Similarity in size, shape, and relative position of parts on opposite sides of a dividing line.

T

TABOURET—A portable cabinet used to hold the artist's drawing tools and materials.

TEAR SHEETS—*Also called* CLIP ART and PICTURE MORGUE.

TECHNICAL ILLUSTRATION—Drawings for technical reports, proposals, manuals, and catalogs, as well as visual aids, briefing charts, projecturals, slides; and posters.

TECHNIQUE—(1) The method of using a tool or medium; (2) The characteristic appearance of a medium; (3) The particular style of an artist.

Continued on next page

Glossary, Continued

T (Continued)	TELEPHOTO LENS —A long focal-length lens that has the effect of bringing far objects nearer.
	TELEVISION GRAPHICS —Graphics created specifically for transmission via television.
	TEMPURA —Dry pigment mixed with an emulsion of egg yolk or milk to form an opaque watercolor.
	TEMPLATE —A guide made to ensure the uniform consistency of frequently used symbols.
	TERTIARY COLORS —Any intermediate hue that contains some part of each of the three primary colors.
	TEXT —Typewritten or printed matter forming the main body of a work.
	TEXTURE —The feel or appearance of a surface created by the repetition of forms or design.
	THERMAL TRANSFER PRINTER —A printer that uses heat to fuse the image to a paper surface.
	THIRD DIMENSION —The effect of depth or bulk achieved by the artist on a flat surface.
	THREE DIMENSIONAL —Possessing height, width, and depth.
	THREE-QUARTER VIEW —A view of an object rotated to a position halfway between a front and a side view.
	THREE-POINT PERSPECTIVE —A view where no dimension, height, width, or depth, is parallel to the plane of projection.
	THUMBNAIL SKETCH —Page layouts showing the allocation of space for headings, photographs, line artwork, and text.

Continued on next page

Glossary, Continued

- T (Continued)** **THUMBSPOTS**—Visual indicators placed on a slide mount to identify the emulsion side of the film and simplify tray loading.
- TILING**—A fill pattern effect that repeats a pattern over and over.
- TILT CARD**—A vertical card that requires up-and-down camera movement.
- TIME LINE**—A projected plan of execution outlining significant milestones and deadlines used to monitor work in progress closely.
- TINT**—A mixture of pure color and white.
- TISSUE OVERLAY**—Thin, translucent paper placed over artwork for protection and corrections.
- TITANIUM WHITE**—An opaque white.
- TITLE BLOCK**—Space in the lower right corner that contains the identity of the drawing, the subject matter, the origins, the scale, and other data.
- TITLE CARD**—A television card that contains text only.
- TONAL**—Having gradations of gray or intermediate values.
- tone**—(1) A value usually predominate that sets the key; (2) A thin layer of paint applied to a ground to eliminate the whiteness of the surface before painting.
- TOOL BOX**—*See* BUTTON BAR.
- TOOTH**—The ability of the paper surface to accept various mediums.
- TORTILLON**—*Also called* STUMP or STOMP. Tightly rolled paper, leather, or felt used to blend charcoal, pastels, pencil, chalk, or crayon.
- TOUCHÉ**—A liquid-masking agent or lithographic crayon applied by brush to a lithographic plate or stone.
-

Continued on next page

Glossary, Continued

- T (Continued)** **TOUCH SCREEN TECHNIQUE**—Activating the pixels on a CRT screen through the touch of an electronic light pen or the fingertip.
- TRACING PAPER**—A thin, transparent, or translucent paper used for transferring an image from one surface to another by tracing.
- TRACKBALL**—*See* JOYSTICK or MOUSE.
- TRAMMEL**—A mechanical device used to draw an ellipse.
- TRANSFER SHEET**—Preprinted characters and symbols on cellophane or acetate used in preparing cold composition, camera-ready copy.
- TRANSLUCENT**—The characteristic of allowing light to pass through without permitting objects to be seen clearly through it.
- TRANSPARENCY**—Any transparent material intended for projection that bears an image.
- TRANSPARENT**—The characteristic of allowing light and objects to be seen clearly through it.
- TRAPS**—A slight overlap of the outline of an element to prevent white space from showing around the edges minimizing the effect of press plate misalignment.
- TRIAD**—The use of any three pigments equally spaced on a color wheel.
- TRIANGLE**—A triangular shaped ruling guide available in various sizes and angles usually made of clear plastic or metal.
- TRIM MARKS**—Marks used on printed sheets or other substrate to indicate where to cut or trim stock both vertically and horizontally.
- TRIMETRIC PROJECTION**—An axonometric projection of an object where no two axes make equal angles with the plane of projection requiring three different foreshortening ratios.
-

Continued on next page

Glossary, Continued

- T (Continued)** **T-SQUARE**—A ruling guide with a 90° angled crosspiece at one end used in making horizontal lines.
- TURPENTINE**—A solvent distilled from the sap of pine or from pine wood used as a thinner and to clean brushes.
- TUTORIAL**—A lesson guide.
- TWO DIMENSIONAL**—Flat, without depth, having only width and height.
- TWO-POINT PERSPECTIVE**—*Also called* ANGULAR PERSPECTIVE. The most common type of perspective drawing where the object is sitting at an angle to the plane of projection and each object has two vanishing points.
- TYPEFACE**—The printing surface of an alphabet judged by its design, printability, wearability, and position on the letter body.
- TYPE FAMILY**—A group of typefaces similar although not exactly alike in design.
- TYPE SERIES**—Different sizes of the same typeface.
- TYPESETTERS, PHOTOGRAPHIC**—Machines that supply a variety of type designs and sizes, automatically letterspaced and justified on transparent film or plastic—coated opaque paper.
- TYPOGRAPHY**—The art of type selection and arrangement.
-

- U** **ULTRAVIOLET LIGHT**—Actinic (shorter wavelength) or useable part of the light spectrum needed to react or harden light-sensitive coatings.
- UNDERTONE**—A color whose effect is modified by other colors imposed over them.
- UNRETOUCHED**—Not altered or improved by any means.
-

Continued on next page

Glossary, Continued

U (Continued) **UPPERCASE**—The capital letters of an alphabet.

USER INTERFACE—The visual and physical attributes of a software program including tools-, text-, and graphics-handling characteristics.

UTILITY PLAN—A floor plan of a structure showing locations of heating, electrical, plumbing, and other service components.

V **VALUE**—The relative lightness and darkness of different areas of the picture represented in tones, shading, line balance, and layout.

VALUE SCALE—The complete range of values from the lightest to the darkest.

VAN DYKE—A brownprint negative and sometimes a brownline positive.

VANISHING POINT—The point at which parallel lines receding from the observer appear to converge in a perspective drawing or photograph.

VARIGRAPH—A lettering device that allows manipulation of letter size, slant, and shape.

VARNISH—A solution made of a resin in a volatile medium.

VEHICLE—A liquid used as a carrier of pigment in paint.

VECTOR-BASED—Images based on a series of plotted points that define precise lines and geometric shapes.

VELLUM—A kind of fine, translucent paper resembling parchment or onion skin used for duplicating copies made with a whiteprint machine.

VELOX—A print of a photograph or other continuous-tone copy prescreened before paste-up or platemaking with line copy eliminating the need for a composite negative.

Continued on next page

Glossary, Continued

V (Continued)	VERTICAL SCAN RATE — <i>Also called</i> FRAME RATE. The number of times per second a screen redraws an image.
	VIDEO DIGITIZING CAMERA —A camera or film recorder attached to the front of a CRT screen used to record images.
	VIDEO DISPLAY TERMINAL (VDT) —A visual display used in photocomposition work in conjunction with a keyboard.
	VIEWING PLANE LINE — <i>See</i> CUTTING PLANE LINE.
	VIEWGRAPH — <i>See</i> PROJECTURAL.
	VIEWPOINT —The eye level of the viewer and the distance from the scene.
	VIGNETTE —Fading an image from heavier to lighter tones blending it into the background or eliminating the background altogether.
	VISIBLE LINE —The outline used for all edges seen by the eye.
	VISUALIZING PAPER —A white, semitransparent paper used for making layouts and preliminary drawings.
	VISUAL LITERACY —The ability to communicate effectively using only visual language.

W	WARM COLORS —Colors associated with heat or fire.
	WASH —A monochromatic rendering with a brush and transparent watercolor.
	WASH DRAWING —A watercolor painting consisting mainly of washes.
	WATERCOLOR —A dry pigment bound by an adhesive, such as gum arabic, and applied, greatly reduced by water, to a surface in a transparent fashion.

Continued on next page

Glossary, Continued

W (Continued) **WAXER**—A device that applies a thin layer of hot, adhesive wax to the back of a surface.

WET BRUSH—A blending technique of laying two pigments side-by-side and blurring the line of demarcation while the pigments are still wet.

WHITE LEAD—A fine, poisonous, opaque white pigment used in flake white and Cremnitz white oil paints.

WIDE ANGLE LENS—A very short focal-length lens that encompasses a larger horizontal view than a standard lens. This lens, depending on the focal length, records an image with increasingly pronounced (barrel) distortion.

WINDOW—*See* BLACK PATCH.

WORD PROCESSING—The transformation of a concept or idea into printed communication media by using mechanical or automated systems, methods, or processes.

WORD SPACING—The adjustment of spacing between words to shorten or extend a line to achieve justification.

WORKING DRAWING—A thorough preliminary drawing done on tracing paper then transferred to a working surface for the finished rendering.

WOVE PAPER—A broad range of papers having an even fiber formation produced over fine wire mesh.

WRAPPING—(1) A computer feature that automatically enters a soft return reveal code and continues to enter data from the same sentence on another line; (2) Selecting a pattern or design and wrapping it around an object on the screen.

WRICO—A hand-lettering system using a set of templates and a drop fed pen.

Continued on next page

Glossary, Continued

X

XEROGRAPHY—A copying process that uses electrostatic forces to form an image.

Z

ZINC WHITE—A zinc-oxide based pigment that is less opaque than titanium and lead white.















































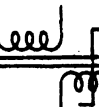


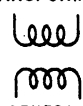







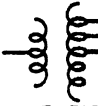
ZIP-A-TONE—A transparent acetate sheet preprinted with patterns of dots or lines that create tone.

ZONE NUMBERS—Numbers and letters on the border of a drawing to provide reference points to aid in locating specific points in the drawing.

ZOOM LENS—A variable focal-length lens that functions as a telephoto lens but allows you to select the range of the object magnification.











































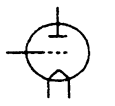
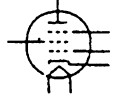
APPENDIX II

Graphics Symbols for Electronic Diagrams

SHIPBOARD SYMBOLS		GRAPHIC SYMBOLS
APPLIANCES; MISCELLANEOUS WIRING (GENERAL) 	CONTROLLER, MOTOR (GENERAL) 	RESISTORS  OR 
BOXES, GENERAL 	BUILDUP EXAMPLES CONTROLLER WITH LOW VOLTAGE RELEASE, RECLOSING UPON RETURN OF POWER 	GENERAL TAPPED 
BRANCH 	CONTROLLER WITH LOW VOLTAGE PROTECTION, REMAINS OPEN UPON RETURN OF POWER 	ADJUSTABLE TAP 
CONNECTION 		CONTINUOUSLY VARIABLE 
DISTRIBUTION 		NONLINEAR 
JUNCTION 		CAPACITORS   
BUS TRANSFER EQUIPMENT NONAUTOMATIC OR PUSH BUTTON CONTROL AC 	FANS FAN, PORTABLE BRACKET 	FIXED VARIABLE TRIMMER  
DC 	FAN, OVERHEAD 	GANGED  
COMMUNICATION EQUIPMENT BOX, SWITCH, TELEPHONE 	HEATERS HEATER, GENERAL 	SPLIT-STATOR 
JACKS 	HEATER, PORTABLE RADIANT 	INDUCTIVE COMPONENTS GENERAL 
PLUGS, TELEPHONE 	LIGHTING UNITS BULKHEAD 	MAGNETIC CORE 
RECEPTACLE OR OUTLET 	BULKHEAD, BERTH 	TAPPED 
SWITCH PUSH BUTTON 	HAND LANTERN 	ADJUSTABLE 
ON-OFF 	NAVIGATIONAL 	ADJUSTABLE OR CONTINUOUSLY ADJUSTABLE 
SELECTOR CIRCUIT LETTER 	NIGHT FLIGHT 	SATURABLE CORE REACTOR 
PANEL OR BULKHEAD 	OVERHEAD 	TRANSFORMERS GENERAL 
NUMBER OF SECTIONS 	PORTABLE 	MAGNETIC CORE TRANSFORMER 
SNAP 	OVERHEAD, FLUORESCENT 	AUTOTransformer 
TRANSFER 		WITH TAPS, SINGLE-PHASE 

APPX II-1

Graphic Symbols for Electronic Diagrams

<p>ARRESTER, LIGHTNING</p> <p>general </p> <p>carbon block </p> <p>electrolytic or aluminum cell </p> <p>horn gap </p> <p>protective gap </p> <p>sphere gap </p> <p>valve or film element </p> <p>multigap </p> <p>ATTENUATOR, FIXED </p> <p>ATTENUATOR, VARIABLE</p> <p>balanced </p> <p>unbalanced </p> <p>BATTERY</p> <p>generalized direct current source; one cell </p> <p>multicell </p>	<p>CAPACITOR</p> <p>general </p> <p>polarized </p> <p>adjustable or variable </p> <p>continuously adjustable or variable differential </p> <p>phase-shifter </p> <p>split-stator </p> <p>feed-through </p> <p>CELL, PHOTOSENSITIVE (Semiconductor)</p> <p>asymmetrical photoconductive transducer </p> <p>symmetrical photoconductive transducer </p> <p>photovoltaic transducer; solar cell </p>	<p>CIRCUIT BREAKER</p> <p>general </p> <p>CLUTCH; BRAKE</p> <p>disengaged when operating means is de-energized </p> <p>engaged when operating means is de-energized </p> <p>COIL, RELAY and OPERATING</p> <p>semicircular dot indicates inner end of wiring </p> <p>CONNECTOR</p> <p>assembly, movable or stationary portion; jack, plug, or receptacle </p> <p>jack or receptacle </p> <p>plug </p> <p>separable connectors </p> <p>two-conductor switch-board jack </p> <p>two-conductor switch-board plug </p> <p>jacks normalled through one way </p>	<p>jacks normalled through both ways </p> <p>2-conductor nonpolarized, female contacts </p> <p>2-conductor polarized, male contacts </p> <p>waveguide flange </p> <p>plain, rectangular </p> <p>choke, rectangular </p> <p>CRYSTAL, PIEZO-ELECTRIC (62) </p> <p>COUPLER, DIRECTIONAL (common coaxial/waveguide usage) </p> <p>ELECTRON TUBE TRIODE, DIRECTLY HEATED CATHODE</p> <p>pentode </p> <p>twin triode, equipotential cathode </p>
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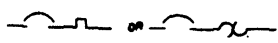


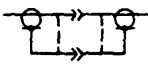
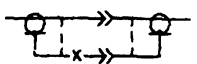
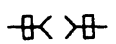
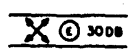

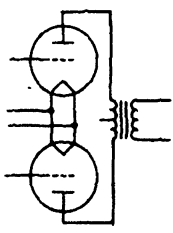
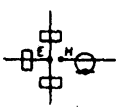

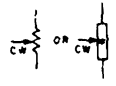
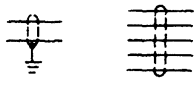

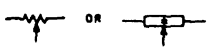
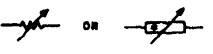

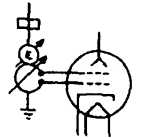

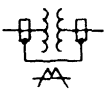


APPXII-2

Graphic Symbols for Electronic Diagrams

<p>(transmission path recognition symbol replaces (*) asterisk)</p> <p>coaxial type in rectangular waveguide</p> <p>circular waveguide type in rectangular waveguide</p> <p>SEMICONDUCTOR DEVICE (73) (Two Terminal, diode)</p> <p>semiconductor diode; rectifier</p> <p>capacitive diode (also Varicap, Varactor, reactance diode, parametric diode)</p> <p>breakdown diode, unidirectional (also backward diode, avalanche diode, voltage regulator diode, Zener diode, voltage reference diode)</p> <p>breakdown diode, bidirectional and backward diode (also bipolar voltage limiter)</p> <p>tunnel diode (also Esaki diode)</p> <p>temperature-dependent diode</p> <p>photodiode (also solar cell)</p>	<p>semiconductor diode, PNP switch (also Shockley diode, four-layer diode and SCR).</p> <p>(Multi-Terminal, transistor, etc.)</p> <p>PNP transistor</p> <p>NPN transistor</p> <p>unijunction transistor, N-type base</p> <p>unijunction transistor, P-type base</p> <p>field-effect transistor, N-type base</p> <p>field-effect transistor, P-type base</p> <p>semiconductor triode, PNP-type switch</p> <p>semiconductor triode, NPN-type switch</p>	<p>NPN transistor, transverse-biased base</p> <p>PNIP transistor, ohmic connection to the intrinsic region</p> <p>PNIN transistor, ohmic connection to the intrinsic region</p> <p>NPIN transistor, ohmic connection to the intrinsic region</p> <p>SQUIB (75)</p> <p>explosive</p> <p>igniter</p> <p>sensing link; fusible link operated</p> <p>SWITCH (76)</p> <p>push button, circuit closing (make)</p> <p>push button, circuit opening (break)</p>	<p>nonlocking; momentary circuit closing (make)</p> <p>nonlocking; momentary circuit opening (break)</p> <p>transfer</p> <p>locking, circuit closing (make)</p> <p>locking, circuit opening (break)</p> <p>transfer, 3-position</p> <p>wafer</p> <p>(example shown: 3-pole 3-circuit with 2 non-shorting and 1 shorting moving contacts)</p> <p>safety interlock, circuit opening and closing</p> <p>SYNCHRO (78)</p> <p>Synchro Letter Combinations</p> <p>CDX Control-differential transmitter</p> <p>CT Control transformer</p> <p>CX Control transmitter</p> <p>TDR Torque-differential receiver</p> <p>TDX Torque-differential transmitter</p> <p>TR Torque receiver</p> <p>TX Torque transmitter</p> <p>RS Resolver</p> <p>B Outer winding rotatable in bearings</p>
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APPXII-3

Graphic Symbols for Electronic Diagrams

<p>CIRCUIT BREAKER (11) with magnetic overload</p>  <p>drawout type</p>  <p>CONNECTOR (18) engaged 4-conductor; the plug has 1 male and 3 female contacts, individual contact designations shown</p>  <p>coaxial, outside conductor shown carried through</p>  <p>coaxial, center conductor shown carried through; outside conductor not carried through</p>  <p>mated choke flanges in rectangular waveguide</p>  <p>COUPLER, DIRECTIONAL (27) (common coaxial/waveguide usage)</p> <p>E-plane aperture-coupling, 30-decibel transmission loss</p> 	<p>COUPLING (28) by loop from coaxial to circular waveguide, direct-current grounds connected</p>  <p>ELECTRON TUBE (34) typical wiring figure to show tube symbols placed in any convenient position</p>  <p>HYBRID (41) (common coaxial/waveguide usage)</p> <p>rectangular waveguide and coaxial coupling</p>  <p>MODE TRANSUCER (53) (common coaxial/waveguide usage)</p> <p>transducer from rectangular waveguide to coaxial with mode suppression, direct-current grounds connected</p> 	<p>MOTION, MECHANICAL (54) rotation applied to a resistor</p>  <p>(identification replaces (*) asterisk)</p> <p>PATH, TRANSMISSION (58) cable; 2-conductor, shield grounded and 5-conductor shielded</p>  <p>RECTIFIER (65) fullwave bridge-type</p>  <p>RESISTOR (68) with adjustable contact</p>  <p>adjustable or continuously adjustable (variable)</p>  <p>(identification replaces (*) asterisk)</p> <p>RESONATOR, TUNED CAVITY (71) (common coaxial/waveguide usage)</p> <p>resonator with mode suppression coupled by an E-plane aperture to a guided transmission path and by a loop to a coaxial path</p> 	<p>tunable resonator with direct-current ground connected to an electron device and adjustably coupled by an E-plane aperture to a rectangular waveguide</p>  <p>SWITCH (76) 2-pole field-discharge knife, with terminals and discharge resistor</p>  <p>(identification replaces (*) asterisk)</p> <p>TRANSFORMER (86) with direct-current connections and mode suppression between two rectangular waveguides</p> <p>(common coaxial/waveguide usage)</p>  <p>shielded, with magnetic core</p>  <p>with a shield between windings, connected to the frame</p> 
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APPENDIX III

General Electrical Symbols

PHONOGRAPH PICK UP 	DYNAMIC SPEAKER 	ANTENNA 	LOOP ANTENNA 	GROUND 	SPARK GAP
LIGHTNING ARRESTER 	DETECTOR OR RECTIFIER GENERIC 	DETECTOR OR RECTIFIER CRYSTAL 	PIEZOELECTRIC CRYSTAL 	INCANDESCENT LAMP 	MERCURY AIR RECTIFIER
ENVELOPE GAS FILLED 	DIODE 	TRIODE 	PENTODE INDIRECTLY HEATED CATHODE 	TRANSISTOR EMITTER COLLECTOR BASE 	TRANSISTOR EMITTER COLLECTOR BASE
TRANSISTOR JUNCTION TYPE 	TRANSISTOR JUNCTION TYPE 	AMPLIFIER 	THERMIONIC FULL WAVE RECTIFIER 	FULL WAVE RECTIFIER GAS FILLED 	PHOTOELECTRIC CELL
GLOW DISCHARGE TUBE 	X-RAY TUBE 	CATHODE RAY TUBE 	SPOT WELDING 	DEPOSIT WELDING 	

APPXIII-1

General Electrical Symbols

RESISTOR 	VARIABLE RESISTOR 	POTENTIOMETER 	RHEOSTATS 	CONDENSERS 	GANGED VARIABLE CONDENSERS
INDUCTORS 	INDUCTOR ADJUSTABLE CORE 	INDUCTOR OR REACTOR POWDERED MAGNETIC CORE 	TRANSFORMER SATURABLE CORE 	TRANSFORMER AIR CORE 	VARIABLE TRANSFORMER
TRANSFORMER MAGNETIC CORE 	AUTO-TRANSFORMER ADJUSTABLE 	CROSSED AND JOINED WIRES 	MAIN CIRCUITS 	FUSE 	COAXIAL CABLES
SHIELDING 	BATTERY 	THERMOELEMENT 	BELL 	AMMETER 	MILLIAMMETER
VOLTMETER 	GALVANOMETER 	WATTMETER 	SWITCH 	DOUBLE POLE SWITCH 	DOUBLE POLE DOUBLE THROW SWITCH
PUSH BUTTON TWO POINT MAKE 	SELECTOR OR CONNECTOR OR FINDER SWITCH 	CIRCUIT BREAKER OVERLOAD 	RELAY 	POLARIZED RELAY 	DIFFERENTIAL RELAY
ANNUNCIATORS SIDE FRONT	DROP ANNUNCIATOR 	DRUM TYPE SWITCH OR CONTROL 	COMMUTATOR MOTOR OR GENERATOR 	REPULSION MOTOR 	INDUCTION MOTOR THREE PHASE SQUIRREL CAGE
INDUCTION MOTOR PHASE WOUND SECONDARY 	SYNCHRONOUS MOTOR OR GEN. THREE PHASE 	MOTOR GENERATOR 	POTARY CONVERTER THREE PHASE 	FREQUENCY CHANGER THREE PHASE 	TROLLEYS
THIRD RAIL SHOE 	RECEIVERS 	TRANSMITTER OR MICROPHONE 	TELEPHONE HOOK 	TELEGRAPH KEY 	SWITCH BOARD PLUG AND JACK

APPXIII-2

APPENDIX IV

General Mechanical Symbols

CONDUIT CROSSING AND INTERSECTING 	SECTIONS LARGE ENDS 	SCREW THREAD 	CLUTCH 	FRICTION CLUTCH 	BRAKE
FLEXIBLE COUPLING 	FLUID COUPLING 	SPROCKET AND CHAIN 	SPUR GEARS 	BEVEL GEARS 	
WORM GEAR 	SPUR GEARS SIDE VIEW 	WELDS 	SPOT WELD 	INJECTOR NOZZLE 	FIXED RESISTANCE

APPX.IV-1

General Mechanical Symbols

VARIABLE RESISTANCE 	PUMP 	CONSTANT DELIVERY PUMP 	VARIABLE DELIVERY PUMP 	REVERSIBLE CONSTANT DELIVERY PUMP 	REVERSIBLE VARIABLE DELIVERY PUMP
GEAR PUMP 	ROTARY SLIDING VANE PUMP 	CENTRIFUGAL PUMP 	LIFT PUMP 	FORCE PUMP 	PNEUMATIC DISCHARGE PUMP
AIR LIFT PUMP 	RAM 	JET 	STEAM ACCUMULATOR 	MECHANICAL PRESSURE ACCUMULATOR 	AIR PRESSURE ACCUMULATOR
RESERVOIR 	MOTOR 	CONSTANT SPEED MOTOR 	VARIABLE SPEED MOTOR 	RECIPROCATING DIFFERENTIAL MOTOR 	RECIPROCATING NON-DIFFERENTIAL MOTOR
GAS ENGINE TWO-CYCLE 	GAS ENGINE FOUR-CYCLE 	DIESEL ENGINE TWO-CYCLE 	DIESEL ENGINE FOUR CYCLE 	TURBINE 	ROCKET MOTOR FLUID FUEL
ROCKET MOTOR SOLID FUEL 	JET MOTOR 	TURBO-JET 	BOILER 	FIRE TUBE BOILER 	FLUE BOILER
WATER TUBE BOILER 	JET CONDENSER 	SURFACE CONDENSER 	JET HEATER 	SURFACE HEATER 	VALVE
THROTTLE VALVE 	CHECK VALVE 	PRESSURE RELIEF VALVE 	CONSTANT PRESSURE OUTLET VALVE 	CONSTANT PRESSURE INLET VALVE 	REDUCING VALVE
THREE-WAY VALVE 	DISTRIBUTING VALVE 	THERMOSTATIC VALVE 	BI-METALLIC THERMOSTAT 	FILTER 	HEAT EXCHANGER

APPX.IV-2








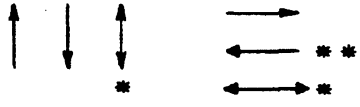

APPENDIX V

Graphic Symbols

for

Aircraft Hydraulic and Pneumatic Systems

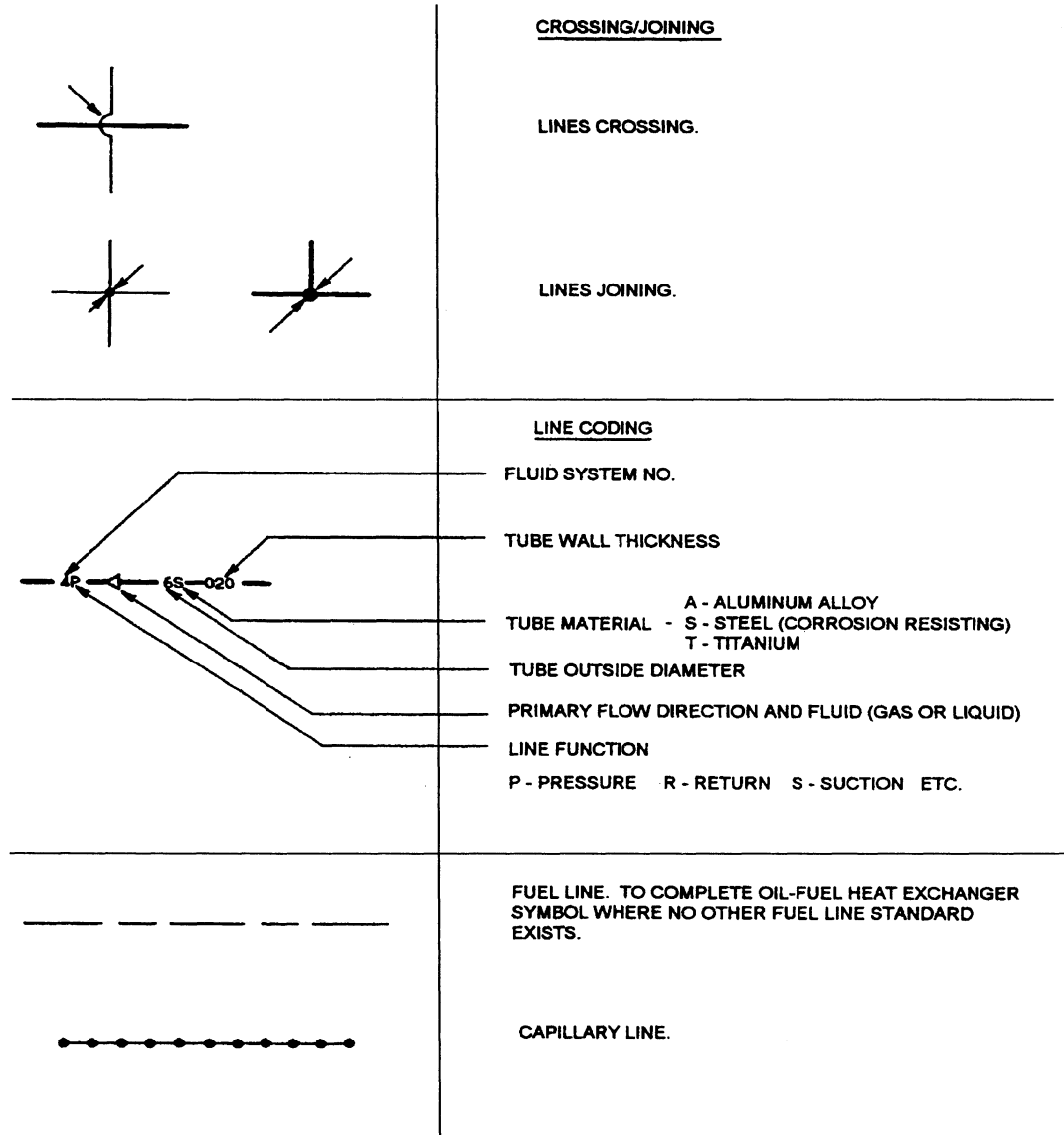
FLUID FLOW LINES - GENERAL

<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">(A) </div> <div style="text-align: center;">(B) </div> <div style="text-align: center;">(C) </div> </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="text-align: center;">(A) </div> <div style="text-align: center;">(B) </div> <div style="text-align: center;">(C) </div> <div style="text-align: center;">(D) </div> </div>	<p style="text-align: center;"><u>FLOW - SOURCES AND DIRECTION</u></p> <p>(A) INDICATION OF HYDRAULIC PRESSURE SOURCE. (B) DIRECTION OF HYDRAULIC FLOW. (C) INTERNAL HYDRAULIC PILOT VALVE; PUMP OR MOTOR ELEMENT.</p> <p>(A) INDICATION OF PNEUMATIC PRESSURE SOURCE. (B) DIRECTION OF PNEUMATIC FLOW. (C) INTERNAL PNEUMATIC PILOT VALVE, PUMP OR MOTOR ELEMENT; GAS PRESSURE. (D) PNEUMATIC EXHAUST PORT, OR ATMOSPHERIC TERMINATION OF FLUID DRAIN LINE.</p>
	<p>NORMAL DIRECTION OF FLOW IN LINES OR VALVES.</p> <p>* FLOW IN EITHER DIRECTION IS POSSIBLE. * * ALTERNATE ARROW HEAD CONFIGURATION.</p>
	<p>DIRECTION OF FREE FLOW.</p>

APPX.V-1

Graphic Symbols for Aircraft Hydraulic and Pneumatic Systems

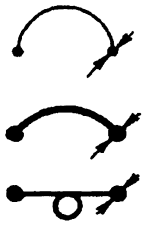

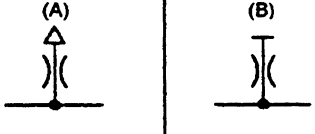
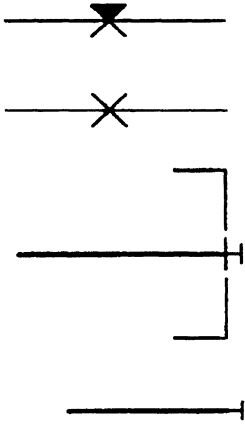
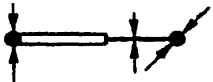
FLUID FLOW LINES - GENERAL



APPX.V-2

Graphic Symbols for Aircraft Hydraulic and Pneumatic Systems

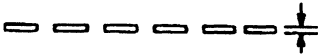



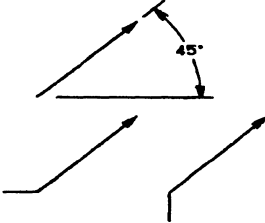



CONNECTORS - FLEXIBLE LINE

	<p>FLEXIBLE LINE (GENERAL SYMBOL).</p> <p>FLEXIBLE HOSE.</p> <p>COILED TUBING, OR TUBING DESIGNED FOR TORSION OR FLEXURE.</p>
	<p>ROTARY OR SWIVEL CONNECTOR, OR JOINT</p> <p>(A) SINGLE FLOW LINE.</p> <p>(B) MORE THAN ONE FLOW LINE REPRESENTS CONCENTRIC, BUT SEPARATE, FLOW PATHS IN ROTARY CONNECTOR.</p>
	<p>BLEEDER FITTING - (A) CONTINUOUS</p> <p>(B) TEMPORARY</p>
	<p>JOINTS</p> <p>PERMANENT JOINTS</p> <p>RECONNECTABLE JOINT</p> <p>PLUGGED PORT, FILL PORT, PRESSURE CAP, DUST CAP.</p> <p>CAPPED LINE</p>
	<p>EXTENSION FITTING</p> <p>SIMPLIFIED SYMBOL. (PRESSURE AND VOLUME BALANCED).</p>

APPX.V-3

Graphic Symbols for Aircraft Hydraulic and Pneumatic Systems












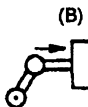

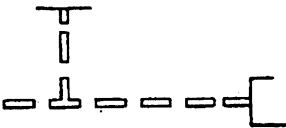
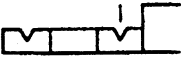
MECHANICAL, ELECTRICAL, AND FUNCTIONAL

	MECHANICAL LINKAGE.
	SHAFT OR PISTON ROD. USE SINGLE LINE FOR VALVE SHAFTS.
	ELECTRICAL LINE.
	DIRECTION OF ROTATION.
	FACILITY FOR VARIABLE CONTROL OF PUMP, SPRING, SOLENOID, ETC. GENERAL SYMBOL. THE ARROW MAY BE BENT, AS SHOWN, TO ADD THE METHOD OF VARIABILITY. FOR AIRCRAFT APPLICATIONS, THE MOST LIKELY COMMON USAGE IS IN THE SYMBOL FOR A VARIABLE DELIVERY PUMP, WHERE THE ADDED PRESSURE COMPENSATION SYMBOL INDICATES AUTOMATIC VARIATION BETWEEN WIDE LIMITS OF FLOW WITH A NARROW VARIATION IN PRESSURE; VALVES, ETC., IS NOT SYMBOLIZED.
	SPRING USED AS A MECHANICAL LINK, CYLINDER INTERNAL RETURN SPRING, ETC.
	PIVOTING DEVICE WITH FIXED FULCRUM, GROUND OR EARTHING POINT. MOVING BODY COMPONENTS, WHICH PART IS FIXED TO STRUCTURE.
	PRESSURE COMPENSATION, GAUGE NEEDLE.

APPX.V-4

Graphic Symbols for Aircraft Hydraulic and Pneumatic Symbols


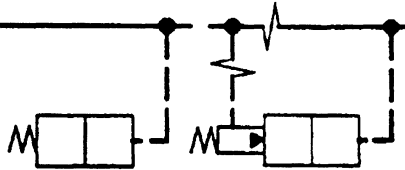

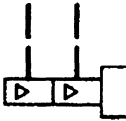



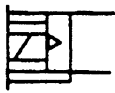

CONTROLS

	SPRING FOR VALVE CONTROL
	MANUAL CONTROL
(A)  (B)  (C) 	(A) PUSH BUTTON (B) PULL BUTTON (C) PUSH-PULL BUTTON
	LEVER
(A)  (B) 	(A) PEDAL (B) TREADLE
(A)  (B) 	(A) MECHANICAL - GENERAL SYMBOL (B) PLUNGER
(A)  (B)  (C) 	(A) MECHANICAL - ROLLER (B) MECHANICAL - ROLLER - ONE DIRECTION (C) MECHANICAL - ROLLER - TWO DIRECTIONS
	REMOTE MANUAL OR MECHANICAL
	DETENT. SHOW A NOTCH FOR EACH DETENT IN THE ACTUAL COMPONENT BEING SYMBOLIZED. A SHORT LINE INDICATES WHICH DETENT IS IN USE. DETENT MAY, FOR CONVENIENCE, BE POSTITIONED ON EITHER END OF SYMBOL. NOTCH USED IN ACTUATORS INDICATES AND INTERNAL LOCK

APPX.V-5

Graphic Symbols for Aircraft Hydraulic and Pneumatic Systems

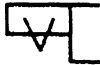
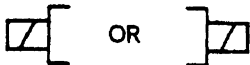

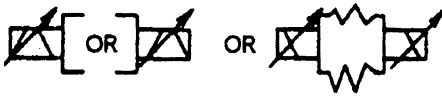
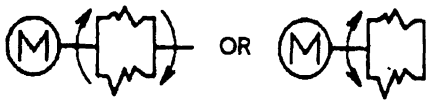
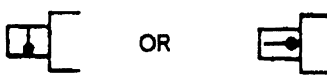
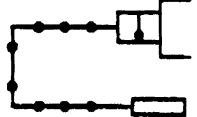
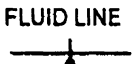
CONTROLS

	DIFFERENTIAL PILOT
	DIRECT PILOT AND COMPOUND OPERATION IN BOTH (A) AND (B), WHEN PRESSURE EXCEEDS SPRING FORCE, R.H. PANEL OPERATES
	FOR NEW SYMBOLS OR FOR SPECIAL EMPHASIS WRITTEN CONTROL OPTIONAL
	ONE SIGNAL, <u>AND</u> A SECOND SIGNAL, BOTH CAUSE THE DEVICE TO OPERATE
	ONE SIGNAL OR THE OTHER SIGNAL, CAUSE THE DEVICE TO OPERATE
	THE SOLENOID <u>AND</u> THE PILOT, <u>OR</u> THE MANUAL OVERRIDE ALONE, CAUSE THE DEVICE TO OPERATE
	THE SOLENOID <u>AND</u> THE PILOT, <u>OR</u> THE MANUAL OVERRIDE <u>AND</u> THE PILOTS, CAUSE THE DEVICE TO OPERATE (PRESSURE CENTERED)
	THE SOLENOID <u>AND</u> THE PILOT, <u>OR</u> THE MANUAL OVERRIDE <u>AND</u> THE PILOT, <u>OR</u> A MANUAL OVERRIDE ALONE, CAUSE THE DEVICE TO OPERATE
	GENERAL SYMBOL FOR SOLENOID-OPERATED PILOT

APPX. V-6

Graphic Symbols for Aircraft Hydraulic and Pneumatic Systems

CONTROLS

	PREVENTS STOPPING IN DEAD CENTER
	<u>ELECTRICAL</u>
	SOLENOID, SINGLE WINDING, FINITE CURRENT INPUT
	TORQUEMOTOR, SINGLE COIL - VARIABLE CURRENT INPUT
	TORQUEMOTOR, DUAL COIL
	REVERSING MOTOR
	<u>TEMPERATURE</u>
	TEMPERATURE (OR THERMAL) - LOCAL SENSING
	REMOTE SENSING
	TEMPERATURE COMPENSATED

APPX.V-7

APPENDIX VI Trigonometric Functions											
deg	sin	cos	tan	cot	deg	sin	cos	tan	cot	deg	sin
40.0	0.6428	0.7660	0.8291	1.1800	40.0	0.6428	0.7660	0.8291	1.1800	47.0	0.7314
.1	.6441	.7649	.8421	1.1875	.9	.6833	.7302	.9358	1.0686	.9	.9358
.2	.6455	.7638	.8451	1.1833	.8	.6845	.7290	.9391	1.0649	.8	.9391
.3	.6468	.7627	.8481	1.1792	.7	.6858	.7278	.9424	1.0612	.7	.9424
.4	.6481	.7615	.8511	1.1750	.6	.6871	.7266	.9457	1.0575	.6	.9457
.5	0.6494	0.7604	0.8541	1.1708	.5	.6884	.7254	.9490	1.0538	.5	.9490
.6	.6508	.7593	.8571	1.1667	.4	.6896	.7242	.9523	1.0501	.4	.9523
.7	.6521	.7581	.8601	1.1626	.3	.6909	.7230	.9556	1.0464	.3	.9556
.8	.6534	.7570	.8632	1.1585	.2	.6921	.7218	.9590	1.0428	.2	.9590
.9	.6547	.7559	.8662	1.1544	.1	.6934	.7206	.9623	1.0392	.1	.9623
41.0	0.6561	0.7547	0.8693	1.1504	49.0	0.6947	0.7193	0.9657	1.0355	46.0	0.9657
.1	.6574	.7536	.8724	1.1463	.9	.6959	.7181	.9691	1.0319	.9	.9691
.2	.6587	.7524	.8754	1.1423	.8	.6972	.7169	.9725	1.0283	.8	.9725
.3	.6600	.7513	.8785	1.1383	.7	.6984	.7157	.9759	1.0247	.7	.9759
.4	.6613	.7501	.8816	1.1343	.6	.6997	.7145	.9793	1.0212	.6	.9793
.5	.6626	.7490	.8847	1.1303	.5	.7009	.7133	.9827	1.0176	.5	.9827
.6	.6639	.7478	.8878	1.1263	.4	.7022	.7120	.9861	1.0141	.4	.9861
.7	.6652	.7466	.8910	1.1224	.3	.7034	.7108	.9896	1.0105	.3	.9896
.8	.6665	.7455	.8941	1.1184	.2	.7046	.7096	.9930	1.0070	.2	.9930
.9	.6678	.7443	.8972	1.1145	.1	.7059	.7083	.9965	1.0035	.1	.9965
42.0	0.6691	0.7431	0.9004	1.1106	48.0	0.7071	0.7071	1.0000	1.0000	45.0	1.0000
.1	.6704	.7420	.9036	1.1067	.9						
.2	.6717	.7408	.9067	1.1028	.8						
.3	.6730	.7396	.9099	1.0990	.7						
.4	.6743	.7385	.9131	1.0951	.6						
.5	.6756	.7373	.9163	1.0913	.5						
.6	.6769	.7361	.9195	1.0875	.4						
.7	.6782	.7349	.9228	1.0837	.3						
.8	.6794	.7337	.9260	1.0799	.2						
.9	.6807	.7325	.9293	1.0761	.1						
	cos	sin	cot	tan	deg		cos	sin	cot	tan	deg

APPX.VI-1

Trigonometric Functions

deg	sin	cos	tan	cot		deg	sin	cos	tan	cot	
0.0	.00000	1.0000	.00000		90.0	4.0	.06976	0.9976	.06993	14.301	86.0
.1	.00175	1.0000	.00175	573.0	.9	.1	.07150	.9974	.07168	13.951	.9
.2	.00349	1.0000	.00349	286.5	.8	.2	.07324	.9973	.07344	13.617	.8
.3	.00524	1.0000	.00524	191.0	.7	.3	.07498	.9972	.17519	13.300	.7
.4	.00698	1.0000	.00698	143.24	.6	.4	.07672	.9971	.07695	12.996	.6
.5	.00873	1.0000	.00873	114.59	.5	.5	.07846	.9969	.07870	12.706	.5
.6	.01047	0.9999	.01047	95.49	.4	.6	.08020	.9968	.08046	12.429	.4
.7	.01222	.9999	.01222	81.85	.3	.7	.08194	.9966	.08221	12.163	.3
.8	.01396	.9999	.01396	71.62	.2	.8	.08368	.9965	.08397	11.909	.2
.9	.01571	.9999	.01571	63.66	.1	.9	.08542	.9963	.08573	11.664	.1
1.0	.01745	0.9998	.01746	57.29	89.0	5.0	.08716	0.9962	.08749	11.430	85.0
.1	.01920	.9998	.01920	52.08	.9	.1	.08889	.9960	.08925	11.205	.9
.2	.02094	.9998	.02095	47.74	.8	.2	.09063	.9959	.09101	10.988	.8
.3	.02269	.9997	.02269	44.07	.7	.3	.09237	.9957	.09277	10.780	.7
.4	.02443	.9997	.02444	40.92	.6	.4	.09411	.9956	.09453	10.579	.6
.5	.02618	.9997	.02619	38.19	.5	.5	.09585	.9954	.09629	10.385	.5
.6	.02792	.9996	.02793	35.80	.4	.6	.09758	.9952	.09805	10.199	.4
.7	.02967	.9996	.02968	33.69	.3	.7	.09932	.9951	.09981	10.019	.3
.8	.03141	.9995	.03143	31.82	.2	.8	.10106	.9949	.10158	9.845	.2
.9	.03316	.9995	.03317	30.14	.1	.9	.10279	.9947	.10334	9.677	.1
2.0	.03490	0.9994	.03492	28.64	88.0	6.0	.10453	0.9945	.10510	9.514	84.0
.1	.03664	.9993	.03667	27.27	.9	.1	.10626	.9943	.10687	9.357	.9
.2	.03839	.9993	.03842	26.03	.8	.2	.10800	.9942	.10863	9.205	.8
.3	.04013	.9992	.04016	24.90	.7	.3	.10973	.9940	.11040	9.058	.7
.4	.04188	.9991	.04191	23.86	.6	.4	.11147	.9938	.11217	8.915	.6
.5	.04362	.9990	.04366	22.90	.5	.5	.11320	.9936	.11394	8.777	.5
.6	.04536	.9990	.04541	22.02	.4	.6	.11494	.9934	.11570	8.643	.4
.7	.04711	.9989	.04716	21.20	.3	.7	.11667	.9932	.11747	8.513	.3
.8	.04885	.9988	.04891	20.45	.2	.8	.11840	.9930	.11924	8.386	.2
.9	.05059	.9987	.05066	19.74	.1	.9	.12014	.9928	.12101	8.264	.1
3.0	.05234	0.9986	.05241	19.081	87.0	7.0	.12187	0.9925	.12278	8.144	83.0
.1	.05408	.9985	.05416	18.464	.9	.1	.12360	.9923	.12456	8.028	.9
.2	.05582	.9984	.05591	17.886	.8	.2	.12533	.9921	.12633	7.916	.8
.3	.05756	.9983	.05766	17.343	.7	.3	.12706	.9919	.12810	7.806	.7
.4	.05931	.9982	.05941	16.832	.6	.4	.12880	.9917	.12988	7.700	.6
.5	.06105	.9981	.06116	16.350	.5	.5	.13053	.9914	.13165	7.596	.5
.6	.06279	.9980	.06291	15.895	.4	.6	.13226	.9912	.13343	7.495	.4
.7	.06453	.9979	.06467	15.464	.3	.7	.13399	.9910	.13521	7.396	.3
.8	.06627	.9978	.06642	15.056	.2	.8	.13572	.9907	.13698	7.300	.2
.9	.06802	.9977	.06817	14.669	.1	.9	.13744	.9905	.13876	7.207	.1
	cos	sin	cot	tan	deg		cos	sin	cot	tan	deg

APPX.VI-2

Trigonometric Functions

deg	sin	cos	tan	cot		deg	sin	cos	tan	cot	
32.0	0.5299	0.8480	0.6249	1.6003	58.0	36.0	.05878	0.8090	0.7265	1.3764	54.0
.1	.5314	.8471	.6273	1.5941	.9	.1	.5892	.8080	.7292	1.3713	.9
.2	.5329	.8462	.6297	1.5880	.8	.2	.5906	.8070	.7319	1.3663	.8
.3	.5344	.8453	.6322	1.5818	.7	.3	.5920	.8059	.7346	1.3613	.7
.4	.5358	.8443	.6346	1.5757	.6	.4	.5934	.8049	.7373	1.3564	.6
.5	.5373	.8434	.6371	1.5697	.5	.5	.5948	.8039	.7400	1.3514	.5
.6	.5388	.8425	.6395	1.5637	.4	.6	.5962	.8028	.7427	1.3465	.4
.7	.5402	.8415	.6420	1.5577	.3	.7	.5976	.8018	.7454	1.3416	.3
.8	.5417	.8406	.6445	1.5517	.2	.8	.5990	.8007	.7481	1.3367	.2
.9	.5432	.8396	.6469	1.5458	.1	.9	.6004	.7997	.7508	1.3319	.1
33.0	0.5446	0.8387	0.6494	1.5399	57.0	37.0	0.6018	0.7986	0.7536	1.3270	53.0
.1	.5461	.8377	.6519	1.5340	.9	.1	.6032	.7976	.7563	1.3222	.9
.2	.5476	.8368	.6544	1.5282	.8	.2	.6046	.7965	.7590	1.3175	.8
.3	.5490	.8358	.6569	1.5224	.7	.3	.6060	.7955	.7518	1.3127	.7
.4	.5505	.8348	.6594	1.5166	.6	.4	.6074	.7944	.7646	1.3079	.6
.5	.5519	.8339	.6619	1.5108	.5	.5	.6088	.7934	.7673	1.3032	.5
.6	.5534	.8329	.6644	1.5051	.4	.6	.6101	.7923	.7701	1.2985	.4
.7	.5548	.8320	.6669	1.4994	.3	.7	.6115	.7912	.7729	1.2938	.3
.8	.5563	.8310	.6694	1.4938	.2	.8	.6129	.7902	.7757	1.2892	.2
.9	.5577	.8300	.6720	1.4882	.1	.9	.6143	.7891	.7785	1.2846	.1
34.0	0.5592	0.8290	0.6745	1.4826	56.0	38.0	0.6157	0.7880	0.7813	1.2799	52.0
.1	.5606	.8281	.6771	1.4770	.9	.1	.6170	.7869	.7841	1.2753	.9
.2	.5621	.8271	.6796	1.4715	.8	.2	.6184	.7859	.7869	1.2708	.8
.3	.5635	.8261	.6822	1.4659	.7	.3	.6198	.7848	.7898	1.2662	.7
.4	.5650	.8251	.6847	1.4605	.6	.4	.6211	.7837	.7926	1.2617	.6
.5	.5664	.8241	.6873	1.4550	.5	.5	.6225	.7826	.7954	1.2572	.5
.6	.5678	.8231	.6899	1.4496	.4	.6	.6239	.7815	.7983	1.2527	.4
.7	.5693	.8221	.6924	1.4442	.3	.7	.6252	.7804	.8012	1.2482	.3
.8	.5707	.8211	.6950	1.4388	.2	.8	.6266	.7793	.8040	1.2437	.2
.9	.5721	.8202	.6976	1.4335	.1	.9	.6280	.7782	.8069	1.2393	.1
35.0	0.5736	0.8192	0.7002	1.4281	55.0	39.0	0.6293	0.7771	0.8098	1.2349	51.0
.1	.5750	.8181	.7028	1.4229	.9	.1	.6307	.7760	.8127	1.2305	.9
.2	.5764	.8171	.7054	1.4176	.8	.2	.6320	.7749	.8156	1.2261	.8
.3	.5779	.8161	.7080	1.4124	.7	.3	.6334	.7738	.8185	1.2218	.7
.4	.5793	.8151	.7107	1.4071	.6	.4	.6347	.7727	.8214	1.2174	.6
.5	.5807	.8141	.7133	1.4019	.5	.5	.6361	.7716	.8243	1.2131	.5
.6	.5821	.8131	.7159	1.3968	.4	.6	.6374	.7705	.8273	1.2088	.4
.7	.5835	.8121	.7186	1.3916	.3	.7	.6388	.7694	.8302	1.2045	.3
.8	.5850	.8111	.7212	1.3865	.2	.8	.6401	.7683	.8332	1.2002	.2
.9	.5864	.8100	.7239	1.3814	.1	.9	.6414	.7672	.8361	1.1960	.1
cos	sin	cot	tan	deg		cos	sin	cot	tan	deg	

APPX.VI-3

Trigonometric Functions

deg	sin	cos	tan	cot		deg	sin	cos	tan	cot	
24.0	0.4067	0.9135	0.4452	2.246	66.0	28.0	0.4695	0.8829	0.5317	1.881	62.0
.1	.4083	.9128	.4473	2.236	.9	.1	.4710	.8821	.5340	1.873	.9
.2	.4099	.9121	.4494	2.225	.8	.2	.4726	.8813	.5362	1.865	.8
.3	.4115	.9114	.4515	2.215	.7	.3	.4741	.8805	.5384	1.857	.7
.4	.4131	.9107	.4536	2.204	.6	.4	.4756	.8796	.5407	1.849	.6
.5	.4147	.9100	.4557	2.194	.5	.5	.4772	.8788	.5430	1.842	.5
.6	.4163	.9092	.4578	2.184	.4	.6	.4787	.8780	.5452	1.834	.4
.7	.4179	.9085	.4599	2.174	.3	.7	.4802	.8771	.5475	1.827	.3
.8	.4195	.9078	.4621	2.164	.2	.8	.4818	.8763	.5498	1.819	.2
.9	.4210	.9070	.4642	2.154	.1	.9	.4833	.8755	.5520	1.811	.1
25.0	0.4226	0.9063	0.4663	2.145	65.0	29.0	0.4848	0.8746	0.5543	1.804	61.0
.1	.4242	.9056	.4684	2.135	.9	.1	.4863	.8738	.5566	1.797	.9
.2	.4258	.9048	.4706	2.125	.8	.2	.4879	.8729	.5589	1.789	.8
.3	.4274	.9041	.4727	2.116	.7	.3	.4894	.8721	.5612	1.782	.7
.4	.4289	.9033	.4748	2.106	.6	.4	.4909	.8712	.5635	1.775	.6
.5	.4305	.9028	.4770	2.097	.5	.5	.4924	.8704	.5658	1.767	.5
.6	.4321	.9018	.4791	2.087	.4	.6	.4939	.8695	.5681	1.760	.4
.7	.4337	.9011	.4813	2.078	.3	.7	.4955	.8686	.5704	1.753	.3
.8	.4352	.9003	.4834	2.069	.2	.8	.4970	.8678	.5726	1.746	.2
.9	.4368	.8996	.4856	2.059	.1	.9	.4985	.8669	.5750	1.739	.1
26.0	0.4384	0.8988	0.4877	2.050	64.0	30.0	0.5000	0.8660	0.5774	1.7321	60.0
.1	.4399	.8980	.4899	2.041	.9	.1	.5015	.8652	.5797	1.7251	.9
.2	.4415	.8973	.4921	2.032	.8	.2	.5030	.8643	.5820	1.7162	.8
.3	.4431	.8965	.4942	2.023	.7	.3	.5045	.8634	.5844	1.7113	.7
.4	.4446	.8957	.4964	2.014	.6	.4	.5040	.8625	.5867	1.7045	.6
.5	.4462	.8949	.4986	2.006	.5	.5	.5075	.8616	.5890	1.6977	.5
.6	.4478	.8942	.5008	1.997	.4	.6	.5090	.8607	.5914	1.6909	.4
.7	.4493	.8934	.5029	1.988	.3	.7	.5105	.8599	.5938	1.6842	.3
.8	.4509	.8926	.5051	1.980	.2	.8	.5120	.8590	.5961	1.6715	.2
.9	.4524	.8918	.5073	1.971	.1	.9	.5135	.8581	.5985	1.6709	.1
27.0	0.4540	0.8910	0.5095	1.963	63.0	31.0	0.5150	0.8572	0.6009	1.6643	59.0
.1	.4555	.8902	.5117	1.954	.9	.1	.5165	.8643	.6032	1.6577	.9
.2	.4571	.8894	.5139	1.946	.8	.2	.5180	.8554	.6056	1.6512	.8
.3	.4586	.8886	.5161	1.937	.7	.3	.5195	.8545	.6080	1.6447	.7
.4	.4602	.8878	.5184	1.929	.6	.4	.5210	.8536	.6104	1.6383	.6
.5	.4617	.8870	.5206	1.921	.5	.5	.5225	.8526	.6128	1.6319	.5
.6	.4633	.8862	.5228	1.913	.4	.6	.5240	.8517	.6152	1.6255	.4
.7	.4648	.8854	.5250	1.905	.3	.7	.5255	.8508	.6176	1.6191	.3
.8	.4664	.8846	.5272	1.897	.2	.8	.5270	.8499	.6200	1.6128	.2
.9	.4679	.8838	.5295	1.889	.1	.9	.5284	.8490	.6224	1.6066	.1
	cos	sin	cot	tan	deg		cos	sin	cot	tan	deg

APPX.VI-4

Trigonometric Functions

deg	sin	cos	tan	cot		deg	sin	cos	tan	cot	
16.0	0.2756	0.9613	0.2867	3.487	74.0	20.0	0.3420	0.9397	0.3640	2.747	70.0
.1	.2773	.9608	.2886	3.465	.9	.1	.3437	.9391	.3659	2.733	.9
.2	.2790	.9603	.2905	3.442	.8	.2	.3453	.9385	.3679	2.718	.8
.3	.2807	.9598	.2924	3.420	.7	.3	.3469	.9379	.3699	2.703	.7
.4	.2823	.9593	.2943	3.398	.6	.4	.3486	.9373	.3719	2.689	.6
.5	.2840	.9588	.2962	3.376	.5	.5	.3502	.9367	.3739	2.675	.5
.6	.2857	.9583	.2981	3.354	.4	.6	.3518	.9361	.3759	2.660	.4
.7	.2874	.9578	.3000	3.333	.3	.7	.3535	.9354	.3779	2.646	.3
.8	.2890	.9573	.3019	3.312	.2	.8	.3551	.9348	.3799	2.633	.2
.9	.2907	.9568	.3038	3.291	.1	.9	.3567	.9342	.3819	2.619	.1
17.0	0.2924	0.9563	0.3067	3.271	73.0	21.0	0.3584	0.9336	0.3839	2.605	69.0
.1	.2940	.9558	.3076	3.271	.9	.1	.3600	.9330	.3859	2.592	.9
.2	.2957	.9553	.3096	3.230	.8	.2	.3616	.9323	.3879	2.578	.8
.3	.2974	.9548	.3115	3.211	.7	.3	.3633	.9317	.3899	2.565	.7
.4	.2990	.9542	.3134	3.191	.6	.4	.3649	.9311	.3919	2.552	.6
.5	.3007	.9537	.3153	3.172	.5	.5	.3665	.9304	.3939	2.539	.5
.6	.3024	.9532	.3172	3.152	.4	.6	.3681	.9298	.3959	2.526	.4
.7	.3040	.9527	.3191	3.133	.3	.7	.3697	.9291	.3979	2.513	.3
.8	.3057	.9521	.3211	3.115	.2	.8	.3714	.9285	.4000	2.500	.2
.9	.3074	.9516	.3230	3.096	.1	.9	.3730	.9278	.4020	2.488	.1
18.0	0.3090	0.9511	0.3249	3.078	72.0	22.0	0.3746	0.9272	0.4040	2.475	68.0
.1	.3107	.9505	.3269	3.060	.9	.1	.3762	.9265	.4061	2.463	.9
.2	.3123	.9500	.3288	3.042	.8	.2	.3778	.9259	.4081	2.450	.8
.3	.3140	.9494	.3307	3.024	.7	.3	.3795	.9252	.4101	2.438	.7
.4	.3156	.9489	.3327	3.006	.6	.4	.3811	.9245	.4122	2.426	.6
.5	.3173	.9483	.3346	2.989	.5	.5	.3827	.9239	.4142	2.414	.5
.6	.3190	.9478	.3365	2.971	.4	.6	.3843	.9232	.4163	2.402	.4
.7	.3206	.9472	.3385	2.954	.3	.7	.3859	.9225	.4183	2.391	.3
.8	.3223	.9466	.3404	2.937	.2	.8	.3875	.9219	.4204	2.379	.2
.9	.3239	.9461	.3424	2.921	.1	.9	.3891	.9212	.4224	2.367	.1
19.0	0.3256	0.9455	0.3443	2.904	71.0	23.0	0.3907	0.9205	0.4245	2.356	67.0
.1	.3272	.9449	.3463	2.888	.9	.1	.3923	.9198	.4265	2.344	.9
.2	.3289	.9444	.3482	2.872	.8	.2	.3939	.9191	.4286	2.333	.8
.3	.3305	.9438	.3502	2.856	.7	.3	.3955	.9184	.4307	2.322	.7
.4	.3322	.9432	.3522	2.840	.6	.4	.3971	.9178	.4327	2.311	.6
.5	.3338	.9426	.3541	2.824	.5	.5	.3987	.9171	.4348	2.300	.5
.6	.3355	.9421	.3561	2.808	.4	.6	.4003	.9164	.4369	2.289	.4
.7	.3371	.9415	.3581	2.793	.3	.7	.4019	.9157	.4390	2.278	.3
.8	.3387	.9409	.3600	2.778	.2	.8	.4035	.9150	.4411	2.267	.2
.9	.3403	.9403	.3620	2.762	.1	.9	.4051	.9143	.4431	2.257	.1
	cos	sin	cot	tan	deg		cos	sin	cot	tan	deg

APPX.VI-5

Trigonometric Functions

deg	sin	cos	tan	cot		deg	sin	cos	tan	cot	
8.0	.13917	0.9903	.14054	7.115	82.0	12.0	0.2079	0.9781	0.2126	4.705	78.0
.1	.14090	.9900	.14232	7.026	.9	.1	.2096	.9778	.2144	4.665	.9
.2	.14263	.9898	.14410	6.940	.8	.2	.2133	.9774	.2162	4.625	.8
.3	.14436	.9895	.14588	6.855	.7	.3	.2130	.9770	.2180	4.586	.7
.4	.14608	.9893	.14767	6.772	.6	.4	.2147	.9767	.2199	4.548	.6
.5	.14781	.9890	.14945	6.691	.5	.5	.2164	.9763	.2217	4.511	.5
.6	.14954	.9888	.15124	6.612	.4	.6	.2181	.9759	.2235	4.474	.4
.7	.15126	.9885	.15302	6.535	.3	.7	.2198	.9755	.2254	4.437	.3
.8	.15299	.9882	.15481	6.460	.2	.8	.2215	.9751	.2272	4.402	.2
.9	.15471	.9880	.15660	6.386	.1	.9	.2233	.9748	.2290	4.366	.1
9.0	.15643	0.9877	.15836	6.314	81.0	13.0	0.2250	0.9744	0.2309	4.331	77.0
.1	.15816	.9874	.16017	6.243	.9	.1	.2267	.9740	.2327	4.297	.9
.2	.15988	.9871	.16196	6.174	.8	.2	.2284	.9736	.2345	4.264	.8
.3	.16160	.9869	.16376	6.107	.7	.3	.2300	.9732	.2364	4.230	.7
.4	.16333	.9866	.16555	6.041	.6	.4	.2317	.9728	.2382	4.198	.6
.5	.16505	.9863	.16734	5.976	.5	.5	.2334	.9724	.2401	4.165	.5
.6	.16677	.9860	.16914	5.912	.4	.6	.2351	.9720	.2419	4.134	.4
.7	.16849	.9857	.17093	5.850	.3	.7	.2368	.9715	.2438	4.102	.3
.8	.17021	.9854	.17273	5.789	.2	.8	.2385	.9711	.2456	4.071	.2
.9	.17193	.9851	.17453	5.730	.1	.9	.2402	.9707	.2475	4.041	.1
10.0	.1736	0.9848	.1763	5.671	80.0	14.0	0.2419	0.9703	0.2493	4.011	76.0
.1	.1754	.9845	.1781	5.614	.9	.1	.2436	.9699	.2512	3.981	.9
.2	.1771	.9842	.1799	5.558	.8	.2	.2453	.9694	.2530	3.952	.8
.3	.1788	.9839	.1817	5.503	.7	.3	.2470	.9680	.2549	3.923	.7
.4	.1805	.9836	.1835	5.449	.6	.4	.2487	.9686	.2568	3.895	.6
.5	.1822	.9833	.1853	5.396	.5	.5	.2504	.9681	.2586	3.867	.5
.6	.1840	.9829	.1871	5.343	.4	.6	.2521	.9677	.2605	3.839	.4
.7	.1857	.9826	.1890	5.292	.3	.7	.2538	.9673	.2623	3.812	.3
.8	.1874	.9823	.1908	5.242	.2	.8	.2554	.9668	.2642	3.785	.2
.9	.1891	.9820	.1926	5.193	.1	.9	.2571	.9664	.2661	3.758	.1
11.0	.1908	0.9816	.1944	5.145	79.0	15.0	0.2588	0.9659	0.2679	3.732	75.0
.1	.1925	.9813	.1962	5.097	.9	.1	.2605	.9655	.2698	3.706	.9
.2	.1942	.9810	.1980	5.050	.8	.2	.2622	.9650	.2717	3.681	.8
.3	.1959	.9806	.1998	5.005	.7	.3	.2639	.9646	.2736	3.655	.7
.4	.1977	.9803	.2016	4.959	.6	.4	.2656	.9641	.2754	3.630	.6
.5	.1994	.9799	.2035	4.915	.5	.5	.2672	.9636	.2773	3.606	.5
.6	.2011	.9796	.2053	4.872	.4	.6	.2689	.9632	.2792	3.582	.4
.7	.2028	.9792	.2071	4.829	.3	.7	.2706	.9627	.2811	3.558	.3
.8	.2045	.9789	.2089	4.787	.2	.8	.2723	.9622	.2830	3.534	.2
.9	.2062	.9785	.2107	4.745	.1	.9	.2740	.9617	.2849	3.511	.1
	cos	sin	cot	tan	deg		cos	sin	cot	tan	deg

APPX.VI-B

APPENDIX VII

References Used To Develop The TRAMAN

NOTE: Although the following references were current when this TRAMAN was published, you will need to ensure you are studying the latest revision.

Chapter 1

Blueprint Reading and Sketching, NAVEDTRA 12014, Naval Education and Training Professional Development and Technology Center, Pensacola, FL, 1994.

Dondis, Donis A., *A Primer of Visual Literacy*, The Massachusetts Institute of Technology Press, Cambridge, MA, 1979.

Giesecke, Frederick E., Alva Mitchell, Henry Cecil Spencer, Ivan Leroy Hill, and John Thomas Dygdon, *Technical Drawing*, Macmillan Publishing Company, New York, NY, 1980.

Knobler, Nathan, *The Visual Dialogue*, Holt, Rinehart, and Winston, Inc., New York, NY, 1971.

Ocvirk, Otto G., Robert O. Bone, Robert E. Stinson, and Philip R. Wigg, *Art Fundamentals, Theory and Practice*, William C. Brown Company, Dubuque, IO, 1975.

Chapter 2

Giesecke, Frederick E., Alva Mitchell, Henry Cecil Spencer, Ivan Leroy Hill, and John Thomas Dygdon, *Technical Drawing*, Macmillan Publishing Company, New York, NY, 1980.

Chapter 3

Blueprint Reading and Sketching, NAVEDTRA 12014, Naval Education and Training Professional Development and Technology Center, Pensacola, FL, 1994.

Giesecke, Frederick, E., Alva Mitchell, Henry Cecil Spencer, Ivan Leroy Hill, and John Thomas Dygdon, *Technical Drawing*, Macmillan Publishing Company, New York, NY, 1980.

Guide For Patent Draftsmen, U. S. Department of Commerce Patent and Trademark Office, U. S. Government Printing Office, Washington, DC, 1975.

Continued on next page

References Used To Develop The TRAMAN, Continued

Chapter 4

Blueprint Reading and Sketching, NAVEDTRA 12014, Naval Education and Training Professional Development and Technology Center, Pensacola, FL., 1994.

Giesecke, Frederick E., Alva Mitchell, Henry Cecil Spencer, Ivan Leroy Hill, and John Thomas Dygdon, *Technical Drawing*, Macmillan Publishing Company, New York, NY, 1980.

Chapter 5

Blueprint Reading and Sketching, NAVEDTRA 12014, Naval Education and Training Professional Development and Technology Center, Pensacola, FL, 1994.

Dondis, Donis A., *A Primer of Visual Literacy*, the Massachusetts Institute of Technology Press, Cambridge, MA, 1979.

Giesecke, Frederick E., Alva Mitchell, Henry Cecil Spencer, Ivan Leroy Hill, and John Thomas Dygdon, *Technical Drawing*, Macmillan Publishing Company, New York, NY, 1980.

Guide For Patent Draftsmen, U.S. Department of Commerce Patent and Trademark Office, U.S. Government Printing Office, Washington, DC, 1975.

Knobler, Nathan, *The Visual Dialogue*, Holt, Rinehart, and Winston, Inc., New York, NY, 1971.

Ovkirk, Otto G., Robert O. Bone, Robert E. Stinson, and Philip R. Wigg, *Art Fundamentals, Theory and Practice*, William C. Brown Company, Dubuque, IO, 1975.

Chapter 6

Blueprint Reading and Sketching, NAVEDTRA 12014, Naval Education and Training Professional Development and Technology Center, Pensacola, FL, 1994.

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